FIRST ANNUAL REPORT

OF THE

BOARD OF TRUSTEES

OF THE

ILLINOIS INDUSTRIAL UNIVERSITY,

FROM THEIR ORGANIZATION, MARCH 12, 1867,

TO THE

CLOSE OF THE ACADEMIC YEAR,

JUNE 13, 1868.

SPRINGFIELD:
BAKER, BAILHACHE & CO. PRINTERS.
1868.

"The use of manual labor is one which never grows obsolete, and which is inapplicable to no person. A man should have a farm or a mechanical craft for his culture. We must have a ba-is for our higher accomplishments, our delicate entertainments of poetry and philosophy, in the work of our hands. We must have an antagonism in the tough world for all the variety of our spiritual faculties, or they will not be born. * * * * * * *

"In general, one may say, that the husbandman's is the oldest and most universal profession, and that where a man does not yet discover in himself any fitness for one work more than another, this may be preferred. But the doctrine of the Farm is merely this, that every man ought to stand in primary relations with the work of the world; ought to do himself, and not to suffer the accident of his having a purse in his pocket, or his having been bred to some dishonorable and injurious craft, to sever him from those duties; and for this reason, that labor is God's education; that he only is a sincere learner, he only can become a master, who learns the secrets of labor, and who by real cunning extorts from nature its sceptre."—*Emerson, Miscellanies*, p. 228–232.

"He must watch the elements: must understand the nature of the soil he tills, the character and habits of each animal that serves him as a living instrument. Each day makes large claims on him for knowledge and sound judgment. He is to apply good sense to the soil. Now these demands tend to foster the habit of observing and judging justly: to increase thought and elevate the man." * * * * * * * *

"To the instructed man his trade is a study: the toils of his craft are books: his farm a gospel, eloquent in its sublime silence: his cattle and corn are teachers: the stars his guides to virtue and to God; and every mute and every living thing, by shore or sea, a heaven-sent prophet to refine his mind and heart. He is in harmony with nature, and his education goes on with the earth and the hours."—*Theodore Parker's Miscellanies*, p. 147–259.

"The chief interest of the country is the business of every citizen; and if statesmen had oftener remembered that the test of national welfare is the intelligence and prosperity of the farmer, States would have been more wisely governed and human society happier; for his pursuit touches the very springs of civilization and employs two-thirds of the human race."—*George William Curtis' Address*, 1865.

"The END of all education should be the development of a TRUE MANHOOD, or the natural, proportionate and healthful culture and growth of all the powers and faculties of the human being—physical, mental, moral and social: and any system which attempts the exclusive or even inordinate culture of any one class of these faculties, will fail of its end—it will make mushrooms and monks, rather than manhood and men."—*J. B. Turner*, 1858.

CONTENTS.

INTRODUCTION.

"AN ACT donating Public Lands to the several States and Territories which may provide Colleges for the benefit of Agriculture and the Mechanic Arts," approved July 2, 1862, prescribes as one of the conditions of the grant, that—

"An annual report shall be made regarding the progress of each college, recording any improvements and experiments made, with their costs and results, and such other matters, including State, industrial and economical statistics, as may be supposed useful; one copy of which shall be transmitted free, by each, to all the other colleges which may be endowed under the provisions of this act, and also one copy to the Secretary of the Interior."

For the purpose of carrying out this requirement of the act of Congress, it was provided, under section 5 of "An act to provide for the organization and maintenance of the Illinois Industrial University," that—

"The Trustees may appoint, also, the Corresponding Secretary, whose duty it shall be, under the direction or with the approval of the Trustees, to issue circulars, directions for procuring needful materials for conducting experiments, and eliciting instructive information from persons in various counties, selected for that purpose, and skilled in any branch of Agricultural, Mechanical and Industrial Art; and to do all other acts needful to enable him to prepare an annual report regarding the progress of the University in each department thereof—recording any improvements and experiments made, with their costs and results, and such other matters, including State, industrial and economical statistics, as may be supposed useful; not less than five thousand copies of which shall be published annually, and one copy be transmitted by said Corresponding Secretary, by mail, free, to each of the other colleges endowed under the provisions of an act of Congress, approved July 2, 1862, entitled "An act donating lands to the several States and Territories which may provide colleges for the benefit of Agriculture and the Mechanic Arts;" one copy to the United States Secretary of the Interior; and one thousand copies to the Secretary of State of this State, for the State Library, and for distribution among the members of the General Assembly. Also, a Recording Secretary, whose duty it shall be to keep faithful record of the transactions of the Board of Trustees, and prepare the same for publication in such annual report."

These quotations from the National and State laws upon the subject, show with sufficient clearness the general duties and requirements of the Board of Trustees, and of the Corresponding and Recording Secretaries in reporting their acts. The very comprehensive wording of the statute concerning the duties of the Corresponding Secretary, however, make it desirable to get more precisely at the meaning of the framers of the State statute.

This law was originally drawn up by a committee consisting of Wm. H. Van Epps, Prof. J. B. Turner, A. B. McConnell, B. G. Roots and John P. Reynolds, appointed at the State Fair held at Decatur in 1864, and was presented to the Legislature as the expression of the views of the farmers of Illinois in 1865 and 1867. Although changed in other and important particulars, the general plan of organization and working was left untouched; and I therefore quote from Professor Turner, who doubtless had an important part in drafting the bill, his statement of the intended function of the University in its relation to *practical* agriculture and arts, and the duties of the Corresponding Secretary as a means of intercourse between academic science and practical art.

In an address delivered at the County Fair at Monmouth, October 4, 1866, Prof. Turner said:

"The charter implies that gratuitous experiments in agriculture and the arts should be annually made under direction of the Board, by the County Superintendents, of each crop or special interest, in all the counties in the State; and annual reports made to the Institution, and by it to all other Institutions of the kind in the Union, and to the central department at the Capital, according to the terms of the grant, and much in the same way as the monthly reports are now made from every county to the same department.

"For example: In each of the one hundred counties of Illinois, for one year, some simple, practical, definite experiment would be tried by an intelligent superintendent for that county, on the corn crop, on a small piece of ground: by another superintendent on the wheat crop: by others on diseases of cattle, and hogs, and flocks; by others on the green crops, the garden and orchard; by others on all sorts of mechanical tools, implements and machines; and on the new composition, strength and quality of materials, etc., etc. In short, whatever the Trustees and Faculty should wish to see put to a general, practical, thorough test, on all the varied soils, and affecting all the varied interests of each county in the State, would be ordered for practical trial on a small and cheap, but sufficient scale, in all the counties of the State, to forever settle that point, as a matter of absolute knowledge or science, and not as mere guess work. Thus the science of agriculture and the sciences of the mechanic arts, will advance, almost without cost, more rapidly toward a state of absolute perfection, than any other sciences ever did, or could, under ordinary conditions.

"Thus, too, the whole State, and eventually the whole Union, will become one vast agricultural, experimental farm; and while producing one crop for our present wealth and support, evolving, as it should do, year by year, scientific knowledge, at once diffused through the annual reports over all classes of society, increasing the intelligence of the workmen, and the fertility and capacity of the soil, year by year and enhancing the products and wealth of the State, in a geometrical ratio, to the latest generations to come. This would be intelligently using the soil, and using the continent as it ought to be used, for the good of mankind—in body and in spirit—in intelligence and in art—in wealth and in power, and not simply living on the soil, much as the pigs do, and rooting a bare living out of it, without social co-operation, or plan, or forecast.

"Thus we should evolve a real agricultural science—evolve wealth, and capacity, and power for all other needful sciences and arts whatever. I know of no sane man who doubts that such an organization of our Industrial Universities, all over the land, would increase our wealth by millions, and increase our intellectual and social activity and power in a still greater proportion. The sun never shone on such a nation, and such a power, as this would soon be, with such facilities of public advancement and improvement, put into full and vigorous operation. Set all the millions of eyes in this great Republic to watching, and intelligently observing and thinking, and there is no secret of nature or art we cannot find out; no disease of man or beast we cannot understand; no evil we cannot remedy; no obstacle we cannot surmount; nothing that lies in the power of man to do or to understand, that cannot be understood and done."

It will be seen from this that large results were expected by the framers of the bill, from the official labors of the Corresponding Secretary; and it is to be hoped that, as the income of the Institution increases, and more means can be spared for the purpose, that this expectation may not be disappointed; as the office can be made, in the hands of the authorities of the University, a most efficient channel of communicating the results of scientific research to practical men, and receiving in turn the isolated facts of experience, whose combination and comparison furnish the best basis of agricultural and mechanical science.

Under the difficulties springing from recent organization, limited means and immature plans, but little could be done or reasonably expected from the efforts of the Corresponding Secretary for the first year after the organization of the University under its charter; and the little that has here been attempted and accomplished may be regarded rather as an indication of the kind of facts wanted, than as any important collection of them.

The large part of the report necessarily occupied by the record of the preliminary labors of the Board of Trustees, has excluded a good deal of matter of a statistical and scientific character, collected for insertion in this report, but now laid over for the next.

In this report, however, will be found a tolerably good presentation of the current practices of our Illinois farmers, and a documentary history compiled from the early writers of our State, on the industrial condition and progress of our people up to a period removed by not much more than one generation from the present time. These two pictures may be regarded as the panorama of the past, giving a general view of the Illinois farmer from the days of the old French settlements to the present time, and in some sort are a summing up of what has been done thus far by our farmers in getting hold of correct theories of agricultural science, and in putting them into practice.

Turning from this presentation of the past to the future, it may not be amiss to indicate what should be done, in part, by this department of the Industrial University in the future.

I. Under the head of Economical Science, a vast work remains to be done in which this department may render efficient service in collecting and collating facts and specimens.

1. The Soils and Subsoils of our State, in all their variety, should be collected and subjected to critical analyses and tests to determine their chemical and mechanical constitution, their peculiar merits or defects, the crops they can most profitably grow, and the manures they can receive with the greatest advantage. Collections similar to those already made by the Illinois Central Railway, and by Mr. Engelmann, late of our State Geological Survey, but much larger, and embracing samples from every county in the State, should, as soon as possible, be made and placed in the cabinet of the University. Our building and lime rocks, coals, clays, etc., should be also collected and tested; but it is presumed that for a considerable part of this work we may depend upon the labors of our Geological Survey.

2. The Meteorology of our State should have a careful study, with the hope of attaining to ultimate practical results. The meteorological data, of which we already have a considerable collection, should be carefully collected and compared, and arrangements made for additional and continued observations in all parts of the State. It is now believed that some of the most destructive vegetable diseases—such as rust in wheat, rot in the potato, mildew and rot of the grape, and blight in the pear tree, are, in part at least, the result of climatological extremes. These conditions should be determined if possible. Numerous stations and

communication with the telegraphic wires would enable us to predict the approach of storms, and to caution the farmer in time of harvest and haying, and the fruit grower at the time of frosts, of the impending danger. Thus the magnetic telegraph and the daily newspaper should be engaged in the immediate service of the American farmer.

3. The Botany of Illinois, both as of interest in itself and as an indication of the character of soils and climates, should be carefully examined in the interest of Industrial science. The economical value of our timber trees and the districts best suited to their growth, and to the growth of trees not native, could thus be measurably determined.

4. The Zoology of our State—especially its Entomology and animals injurious and useful to the farmer and fruit grower—also claims a thorough examination, although the State Entomologist will, in his department, no doubt do all that need be done in that behalf. But the habits of birds as insect and fruit eaters, for instance, need farther examination to determine the facts and the policy to be pursued by the grower of grapes and cherries.

Under all these heads of Economical Science much can be done by merely gathering up facts and observations now isolated, and putting them into new relations, whilst many new facts can be obtained by calling the attention of persons of scientific tastes to the class of facts that we desire to know. There will remain more or less deficiences to be supplied by our own observations, at the University and elsewhere.

II. This brings up the subject of Experimental Stations or points in different parts of the State, where meteorological observations, chemical analyses, and experiments of more or less practical character, can be carried on simultaneously and in unison with similar experiments and observations at the Industrial University. The advantage of these Stations in Germany was noticed and commented upon by President Pugh, of the Pennsylvania Agricultural College, and latterly by Prof. Johnson, of Yale, in his valuable hand-book entitled "How Crops Grow." Prof. Johnson cites the efforts of Scotch and English agriculturists in this direction, adds: "It is, however, in Germany, that the most expensive and well organized efforts have been made by associations of agriculturists, to help their practices by developing theory. In *1851 the Agricultural Society of* Leipsic (*Leipziger Oeconomise*

Societaet) established an *Agricultural Experiment Station* on its farm at Maeckern, near that city. This example was soon imitated in other parts of Germany and the neighboring countries; and at the present writing, 1867, there are of similar Experiment Stations in operation—in Prussia, 10; in Saxony, 4; in Bavaria, 3; in Austria, 3; in Brunswick, Hesse, Thuringia, Anhalt, Wirtemberg, Baden and Sweden, 1 each; making a total of 26, chiefly sustained by, and operating in, the interest of the agriculturists of those countries. These Stations give constant employment to 60 chemists and vegetable physiologists, of whom a large number are occupied largely or exclusively with theoretical investigations; while the work of others is devoted to more practical matters, as testing the value of commercial fertilizers. Since 1859 a journal (*Die Landwirthschaftlichen Versuchs Stationen*—Agricultural Experiment Stations) has been published as the organ of these establishments, and the nine volumes now completed, together with the numerous reports of the Stations themselves, have largely contributed the facts that are made use of in the following pages."

"Such a Station," according to Dr. Pugh, "should embrace a farm for experiments in the growth of crops, a chemical laboratory for examining them, and stalls, stables, etc., adapted to feeding animals, with a view of estimating the value of different kinds of food for cattle." Perhaps the least expensive method of establishing such Stations in Illinois, is to seek out our most intelligent and inquiring farmers, in different parts of the State, who in their own farms have already most of the means of experiment. Supply these men with meteorological instruments, and they can easily furnish meteorological reports. Supply them with seed and instructions as to the character of an experiment, and they can carry it out in a practical way. The same would be true with experiments in feeding, etc. As practical chemists, they would not often be competent; but, with this exception, our more intelligent farmers can be used as experimenters. Such men should be paid for their services an amount sufficient to insure the thorough performance of the duties wherewith they are charged, without detriment to their private interests. If practicable, as it may be in some cases, to bring into juxtaposition with such an experimental farmer, a college or high school, with its chemical apparatus and professor, and a meteorological observer, we could thus ensure a better quality of work in the division of labor. Probably such may, sooner

or later, be the case at Chicago, Galesburg, Bloomington, Jacksonville, Alton, Irvington, and other points. These Stations, however, should at first go to the men and the communities who can appreciate their advantages; where enthusiasts will labor from their love of the subject, and where farmers will be willing to contribute something to support in their midst an attempt to throw the lights of science upon their arts of agriculture.

III. In accordance with the Congressional and Legislative acts the collection of State Industrial and Economical Statistics, is made a part of the duty of the Board of Trustees, and devolved upon the Corresponding Secretary. This can hardly be efficiently done without some grant of power under State law, or better, some State provision for a Statistical Bureau, from which the kind of statistics needed can be drawn. And in view of the strongly expressed opinions of our State Agricultural Society, and of our State Board of Equalization of Taxes, it may be hoped that the next Legislature will make provision for an annual collection of statistics, embracing the progress of Agriculture, Manufactures, Commerce, and other industrial pursuits, as well as vital and social statistics.

IV. The holding of Annual Conventions—either general, as of Farmers, or special, as of Fruit Growers, Wool Growers and Cattle Breeders—is an important aid in gathering facts and disseminating scientific knowledge, and may, perhaps, be regarded as within the province of the Corresponding Secretary. The importance of these "Farmers' Institutes," as they have been aptly termed, I have already insisted upon in a communication addressed to the Committee on Course of Study and Faculty of the University, and published in the Prairie Farmer of December 21st, 1867. I will ask leave to repeat my reasons in favor of such a course.

"1. It 'breaks ground' at the best point. The people of this State look to this Institution for something of more practical value in its immediate application to every-day affairs, than other Institutions have been in the habit of furnishing. A course of lectures and discussions of this kind will show that we are endeavoring to supply that want, and gain their good will to educational schemes of less obvious, though not less real, utility.

"2. Such a course will give a start in self education to a large class who cannot or will not attend the longer courses. The young, or the middle aged man who can spend a week or two in the discussion of topics relating to his every-day business, will go home with material for thought, and theories for better practice, that will last him for years. It will have a tendency also to draw persons into the longer

courses, and to make them anxious that their relatives and friends should avail themselves of the advantages of this Institution. In short, such a course will create a better appreciation of industrial education.

"3. Such a course is also directly valuable as a means of education. While it is somewhat superficial, it has a value from coming into immediate contact with the facts, practices and economies of every-day experience that can hardly be overrated. This is well expressed in the words of the late Prof. John A. Porter, in the New Englander for November, 1859. 'The solution which we propose is the enlistment of practical men, who are not professional teachers, in the work of instruction, and their combination in such numbers, that a small contribution of time and labor from each shall make a sufficient aggregate to meet the object in view. The special necessity for such a system, in the case of the pursuit we are considering, grows out of the fact that there is much in agriculture which has not yet taken the form of science, and can only be acquired from practical men.'

"4. Such courses would be of value to the Faculty of the University in bringing them into contact with the classes whose needs and deficiencies they wish to supply, and thus giving them a more correct idea of practical education, and the drift of things outside the academic walls. Teachers need this, above all other teachers, in an Industrial University."

V. Personal observation of the farms of our best farmers, and the manufactories of our best mechanics, would be a valuable method of getting hold of the best practical methods in the varied pursuits of Agriculture and the Mechanic Arts; and through the medium of this report the result of such observations could be communicated to all who cared to know. Thus, in another way, the practices of our best grain, grass and stock growers could be communicated to all our farmers, and our methods of farming much improved. Visits to the orchards and vineyards of our best fruit growers, would give, as they already have given, new and better ideas of Horticulture. The workshops of our mechanics would doubtless furnish other valuable material for the study of our ar isans.

By such methods as these we may, I think, fairly hope to do a great and good work for our fair and fertile State, and make her as illustrious in the intelligence and wise economy of her industries, as she already is in her natural advantages and her political and military power.

W. C. F.

LAWS CONCERNING THE INDUSTRIAL UNIVERSITY,

LAWS OF CONGRESS.

AN ACT donating Public Lands to the several States and Territories which may provide Colleges for the benefit of Agriculture and the Mechanic Arts.

Be it enacted by the Senate and House of Representatives of the United States of America, in Congress assembled, That there be granted to the several states, for the purposes hereinafter mentioned, an amount of public land, to be apportioned to each state, in quantity equal to 30,000 acres for each senator and representative in Congress to which the states are respectively entitled by the apportionment under the census of 1860: *Provided,* That no mineral lands shall be selected or purchased under the provisions of this act.

§ 2. *And be it further enacted,* That the land aforesaid, after being surveyed, shall be apportioned to the several states in sections or sub-divisions of sections not less than one-quarter of a section; and whenever there are public lands in a state, subject to sale at private entry, at one dollar and twenty-five cents per acre, the quantity to which said state shall be entitled, shall be selected from such lands, within the limits of such state; and the secretary of the interior is hereby directed to issue to each of the states, in which there is not the quantity of public lands subject to sale at private entry, at one dollar and twenty-five cents per acre, to which said state may be entitled under the provisions of this act, land scrip to the amount in acres for the deficiency of its distributive share; said scrip to be sold by said states, and the proceeds thereof applied to the uses and purposes prescribed in this act, and for no other use or purpose whatsoever: *Provided,* That in no case shall any state to which land scrip may thus be issued, be allowed to locate the same within the limits of any other state, or of any territories of the United States; but their assignees may thus locate said land scrip upon any of the unappropriated lands of the United States subject to sale at private entry, at one dollar and twenty-five cents or less per acre. *And provided further,* That not more than one million acres shall be located by such assignees in any one of the taates. *And provided further,* That no such locations shall be made before one year from the passage of this act.

§ 3. *And be it further enacted,* That all the expenses of management, superintendence and taxes from date of selection of said lands, previous to their sales, and all expenses incurred in the management and disbursement of the moneys which may be received therefrom, shall be paid by the states to which they may belong, out of the treasury of said states, so that the entire proceeds of the sale of said lands shall be applied, without any diminution whatever, to the purposes hereinafte mentioned.

§ 4. *And be it further enacted*, That all moneys derived from the sale of lands aforesaid, by the states to which the lands are apportioned, and from the sales of land scrip hereinbefore provided for, shall be invested in stocks of the United States, or of the states, or some other safe stocks, yielding not less than five per cent. upon the par value of said stocks; and that the money so invested shall constitute a perpetual fund, the capital of which shall remain forever undiminished (except so far as may be provided in section fifth of this act), and the interest of which shall be inviolably appropriated by each state, which may take and claim the benefit of this act, to the endowment, support and maintenance of, at least, one college, where the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the legislatures of the states may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life.

§ 5. *And be it further enacted*, That the grant of land and scrip hereby authorized, shall be made on the following conditions, to which, as well as to the provisions hereinbefore contained, the previous assent of the several states shall be signified by legislative acts:

First—If any portion of the fund invested, as provided by the foregoing section, or any portion of the interest thereon, shall, by any action, or contingency, be diminished or lost, it shall be replaced by the state to which it belongs, so that the capital of the fund shall remain forever undiminished; and the annual interest shall be regularly applied without diminution to the purposes mentioned in the fourth section of this act, except that a sum, not exceeding ten per centum upon the amount received by any state under the provisions of this act, may be expended for the purchase of lands for sites or experimental farms, whenever authorized by the respective legislatures of said states.

Second—No portion of said fund, nor the interest thereon, shall be applied, directly or indirectly, under any pretense whatever, to the purchase, erection, preservation or repair of any building or buildings.

Third—Any state which may take and claim the benefit of the provisions of this act, shall provide, within five years, at least not less than one college, as prescribed in the fourth section of this act, or the grant to such state shall cease; and said state shall be bound to pay the United States the amount received of any lands previously sold, and that the title to purchasers under the state shall be valid.

Fourth—An annual report shall be made regarding the progress of each college, recording any improvements and experiments made, with their cost and results, and such other matters, including state industrial and economical statistics, as may be supposed useful; one copy of which shall be transmitted by mail free, by each, to all the other colleges which may be endowed under the provisions of this act, and also one copy to the secretary of the interior.

Fifth—When lands shall be selected from those which have been raised to double the minimum price in consequence of railroad grants, they shall be computed to the states at the *maximum price, and the number of acres proportionally diminished.*

Sixth—No state, while in a condition of rebellion or insurrection against the government of the United States, shall be entitled to the benefits of this act.

Seventh—No state shall be entitled to the benefits of this act, unless it shall express its acceptance thereof by its legislature within two years from the date of the approval by the President.

§ 6. *And be it further enacted*, That land scrip issued under the provision of this act, shall not be subject to location until after the first day of January, 1863.

§ 7. *And be it further enacted*, That land officers shall receive the same fee for locating land scrip issued under the provisions of this act, as is now allowed for the location of military bounty land warrants under existing laws: *Provided*, Their maximum compensation shall not be thereby increased.

§ 8. *And be it further enacted*, That the governors of the several states to which scrip shall be issued under this act, shall be required to report annually to congress all sales made of such scrip until the whole shall be disposed of, the amount received for the same, and what appropriation has been made of the proceeds.

Approved July 2d, 1862.

AN ACT to amend the fifth section of an act entitled "An act donating public lands to the several States and Territories which may provide Colleges for the benefit of Agriculture and the Mechanic Arts," approved July two, eighteen hundred and sixty-two, so as to extend the time within which the provisions of said act shall be accepted and such colleges established.

Be it enacted by the Senate and House of Representatives of the United States of America, in Congress assembled, That the time in which the several states may comply with the provisions of the act of July two, eighteen hundred and sixty-two, entitled "An act donating public lands to the several states and territories which may provide colleges for the benefit of agriculture and the mechanic arts," is hereby extended so that the acceptance of the benefits of said act may be expressed within three years from the passage of this act, and the colleges required by the said act may be provided within five years from the date of the filing of such acceptance with the commissioner of the general land office: *Provided*, That when any territory shall become a state and be admitted into the Union, such new state shall be entitled to the benefits of the said act of July two, eighteen hundred and sixty-two, by expressing the acceptance therein required within three years from the date of its admission into the Union, and providing the college or colleges within five years after such acceptance, as prescribed in this act: *Provided*, *further*, That any state which has heretofore expressed its acceptance of the act herein referred to, shall have the period of five years within which to provide at least one college, as described in the fourth section of said act, after the time for providing said college, according to the act of July second, eighteen hundred and sixty-two, shall have expired.

Approved July 23, 1866.

LAWS OF ILLINOIS.

AN ACT in relation to the location of the Industrial University.

Whereas, Each portion of the state is alike interested in the proper location of said University, and it is desirable to enable the public spirit in each community or section to fully compete for such location; therefore,

Section 1. *Be it enacted by the People of the State of Illinois, represented in the General Assembly*, That any county, city, township or incorporated town of said state, may, by taxation, as well as by voluntary subscription of its citizens, raise a fund to secure the location of said University at any point whatever; and any other corporation in this state may make bids and subscription for the purpose of securing said location at any point whatever.

§ 2. That any county, through its county court or board of supervisors, and any township or town, through its supervisor, assessor and collector, and any city or incorporated town, through its council or board of aldermen, or other constituted authorities, as the case may be, may subscribe such sum or sums as they may deem necessary, to secure such location, and to raise the amount or amounts so subscribed by taxation, or by issuing bonds, payable at any seasonable or convenient time, and bearing any rate of interest not exceeding ten per cent. per annum: *Provided, however*, That no tax shall be levied for such purpose until the proposition so to raise a fund, together with the amount to be raised shall, after at least ten days' notice, be submitted to a vote of the people so to be taxed, and be approved by a majority of the persons voting at such election: *Provided*, That the county clerk of such county shall order an election in accordance with the provisions of this act: *And provided, also*, That it shall not be obligatory on any county, city or town authorities, or county clerk, as aforesaid, to submit any such proposition to a vote of the people, unless at least one hundred of the legal voters of said county, city or town shall petition for the same; in which event said election or elections shall be ordered: *And provided further*, That any election heretofore held in any county, city or town, for the purpose aforesaid, is hereby legalized and made valid.

§ 3. The county, city or town authorities, as aforesaid, are hereby invested with full power to make any and all needful orders and regulations to carry into effect the foregoing provisions; and in case of an election being applied for, as aforesaid, it shall be the duty of said authorities to give the usual and seasonable notice, required by law, according to this act, and the end in view, and to conduct and report the same in the usual way. Such election to be conducted and return made according to the law governing elections: *Provided*, That the registry of voters used at the last general [election] shall be the registry for any election to be held under this act.

§ 4. This act shall be a public act, to take effect and be in force from and after its passage.

Approved January 25, 1867.

AN ACT to provide for the organization and maintenance of the Illinois Industrial University.

SECTION 1. *Be it enacted by the People of the State of Illinois, represented in the General Assembly,* That it shall be the duty of the governor of this state within ten days from the passage of this act, to appoint five trustees, resident in each of the judicial grand divisions of this state, who, together with one additional trustee, resident in each of the congressional districts of this state, to be appointed in like manner, with their associates and successors, shall be a body corporate and politic, to be styled "The Board of Trustees of the Illinois Industrial University;" and by that name and style shall have perpetual succession, have power to contract and be contracted with, to sue and be sued, to plead and to be impleaded, to acquire, hold and convey real and personal property; to have and use a common seal, and to alter the same at pleasure; to make and establish by-laws, and to alter or repeal the same as they shall deem necessary, for the management or government, in all its various departments and relations, of the Illinois Industrial University, for the organization and endowment of which provision is made by this act. Said appointments to be subject to approval or rejection by the senate at its next regular session thereafter, and the appointees to be and they are hereby authorized to act as trustees as aforesaid, until their successors shall be appointed by the governor and such appointment shall be approved by the senate.

§ 2. The members of the board of trustees, and their successors, shall hold their office for the term of six years each: *Provided,* That at the first regular meeting of said board, the said members shall determine, by lot, so that, as nearly as may be, one-third shall hold their office for two years, one-third for four years, and one-third for six years from the first day of said meeting. The governor, by and with the advice and consent of the senate, shall fill all vacancies which may at any time occur by expiration of term of office, or otherwise, in said board, by appointment of suitable persons resident in the respective grand divisions and congressional districts in which such vacancies may occur. Said board of trustees may appoint an executive committee of their own number, who, when said board is not in session, shall have the management and control of the same, and for that purpose have and exercise all the powers hereby conferred on said board which are necessary and proper for such object.

§ 3. In case the board of trustees shall at any time determine to establish a branch or department of said University at any points elected by them, such branch or department shall be under the control of the members of said board residing in the grand division and congressional district where such branch shall be located, unless otherwise ordered by said board of trustees: *Provided,* That no portion of the funds resulting from the congressional grant of land for the endowment of said University, or from any donation now or hereafter to be made by the county, city or town at or near which the University is located; and no portion of the interest or proceeds of either of said funds shall ever be applied to the support of any branch or department located outside of the county wherein said University is located by this act.

§ 4. The first regular meeting of the board of trustees shall be held at such place as the governor may designate, on the second Tuesday in March, A. D. 1867, at which meeting they shall elect a regent of the University, who, together with the governor, superintendent of public instruction, and president of the state agricultural society, shall be, *ex-officio,* members of said board of trustees. Said regent, if

present, shall preside at all meetings of the board of trustees and of the faculty, and shall be charged with the general supervision of the educational facilities and interests of the University. His term of office shall be two years, and his compensation shall be fixed by the board of trustees.

§ 5. At the first, and at each biennial meeting thereafter, it shall be the duty of the board to appoint a treasurer, who shall not be a member of the board, and who shall give bonds, with such security as the board of trustees shall deem amply sufficient to guard the University from danger of loss or diminution of the funds intrusted to his care. The trustees may appoint, also, the corresponding secretary, whose duty it shall be, under the direction or with the approval of the trustees, to issue circulars, directions for procuring needful materials for conducting experiments, and eliciting instructive information from persons in various counties, selected for that purpose, and skilled in any branch of agricultural, mechanical and industrial art; and to do all other acts needful to enable him to prepare an annual report regarding the progress of the University, in each department thereof—recording any improvements and experiments made, with their costs and results, and such other matters, including state, industrial and economical statistics, as may be supposed useful; not less than five thousand copies of which reports shall be published annually, and one copy be transmitted by said corresponding secretary, by mail, free, to each of the other colleges endowed under the provisions of an act of congress, approved July 2, 1862, entitled "An act donating lands to the several states and territories which may provide colleges for the benefit of agriculture and the mechanic arts;" one copy to the United States secretary of the interior; and one thousand copies to the secretary of state of this state, for the state library, and for distribution among the members of the general assembly. Also, a recording secretary, whose duty it shall be to keep faithful record of the transactions of the board of trustees, and prepare the same for publication in said annual report. The said treasurer, corresponding and recording secretaries to receive such compensation as the trustees may fix, and to be paid in the same manner as the teachers and other employees of the University are paid.

§ 6. No money shall be drawn from the treasury of the University, except by order of the board of trustees, on warrant of the regent, drawn upon the treasurer, and countersigned by the recording secretary.

§ 7. The trustees shall have power to provide the requisite buildings, apparatus and conveniences; to fix the rates for tuition; to appoint such professors and instructors, and establish and provide for the management of such model farms, model art, and other departments and professorships, as may be required to teach, in the most thorough manner, such branches of learning as are related to agriculture and the mechanic arts, and military tactics, without excluding other scientific and classical studies They may accept the endowments of voluntary professorships or departments in the University, from any person or persons or corporations who may proffer the same, and, at any regular meeting of the board, may prescribe rules and regulations in relation to such endowments, and declare on what general principles they may be admitted: *Provided*, That such special voluntary endowments or professorships shall not be incompatible with the true design and scope of the act of congress, or of this act; and they shall, as far as practicable, arrange all the regular and more important courses of study and lectures in the University, so that the students may pass through and attend upon them during the six autumn and winter months, and be left free to return to their several practical arts and industries at

home during the six spring and summer months of the year, or to remain in the University and pursue such optional studies or industrial avocations as they may elect: *Provided*, That no student shall at any time be allowed to remain in or about the University in idleness, or without full mental or industrial occupation: *And provided further*, That the trustees, in the exercise of any of the powers conferred by this act, shall not create any liability or indebtedness in excess of the funds in the hands of the treasurer of the University at the time of creating such liability or indebtedness, and which may be specially and properly applied to the payment of the same.

§ 8. No student shall be admitted to instruction in any of the departments of the University who shall not have attained to the age of fifteen (15) years, and who shall not previously undergo a satisfactory examination in each of the branches ordinarily taught in the common schools of the state.

§ 9. Each county in this state shall be entitled to one honorary scholarship in the University, for the benefit of the descendants of the soldiers and seamen who served in the armies and navies of the United States during the late rebellion—preference being given to the children of such soldiers and seamen as are deceased or disabled; and the board of trustees may, from time to time, add to the number of honorary scholarships when, in their judgment, such additions will not embarrass the finances of the University; nor need these additions be confined to the descendants of soldiers and seamen; such scholarships to be filled by transfer from the common schools of said county, of such pupils as shall, upon public examination, to be conducted as the board of trustees of the University may determine, be decided to have attained the greatest proficiency in the branches of learning usually taught in the common schools, and who shall be of good moral character, and not less than fifteen (15) years of age. Such pupils, so selected and transferred, shall be entitled to receive, without charge for tuition, instruction in any or all departments of the University for a term of at least three (3) consecutive years: *Provided*, Said pupil shall conform, in all respects, to the rules and regulations of the University, established for the government of the pupils in attendance.

§ 10. The faculty of the University shall consist of the chief instructors in each of the departments. No degrees shall be conferred nor diplomas awarded by authority of the board of trustees, or of the faculty, except that the trustees, on recommendation of the majority of the faculty, may authorize the regent of the University to issue to applicants certificates of scholarship, under the seal of the University; which certificates shall, as far as practicable, set forth the precise attainments, as ascertained by special examination, of the parties applying for the same, respectively, in the various branches of learning they may have respectively studied during the attendance in the University; and every pupil who shall have attended upon instruction in the University for not less than one year, maintaining, meanwhile, a good character for faithfulness in study and correctness of deportment, and who may desire to cease such attendance, shall be entitled to receive such certificate of scholarship as is authorized by this section to be issued. All certificates of scholarship shall be in the English language, unless the pupil should otherwise prefer; and all names and terms on labels, samples, specimens, books, charts and reports shall be expressed, as nearly as may be, in the English language.

§ 11. No member of the board of trustees shall receive any compensation for attending on the meetings of the board. At all the stated and other meetings of the board of trustees, *called by the regent or corresponding* secretary, or any five

members of the board, a majority of the members shall constitute a quorum: *Provided*, All the members have been duly notified.

§ 12. It shall be the duty of the board of trustees to permanently locate said University at Urbana, in Champaign county, Illinois, whenever the county of Champaign shall, according to the proper forms of law, convey or cause to be conveyed to said trustees, in fee simple, and free from all incumbrances, the Urbana and Champaign Institute buildings, grounds and lands, together with the appurtenances thereto belonging, as set forth in the following offer in behalf of said county, to-wit:

"The undersigned, a committee appointed by the board of supervisors of Champaign county, are instructed to make the following offer to the state of Illinois, in consideration of the permanent location of the Illinois Industrial University at Urbana, Champaign county, viz: We offer the Urbana and Champaign Institute buildings and grounds, containing about ten acres; also, one hundred and sixty acres of land adjacent thereto; also, four hundred acres of land, it being part of section No. twenty-one, in township No. nineteen north, range No. nine east, distant not exceeding one mile from the corporate limity of the city of Urbana.

"Also, four hundred and ten (410) acres of land, it being part of section No. nineteen, township No. nineteen, range No. nine east, within one mile of the buildings herein offered.

"Also, the donation offered by the Illinois Central Railroad Company of fifty thousand dollars' worth of freight over said road for the benefit of said University.

"Also, one hundred thousand dollars in Champaign county bonds, due and payable in ten years, and bearing interest at the rate of ten per cent. per annum, and two thousand dollars in fruit, shade and ornamental trees and shrubbery, to be selected from the nursery of M. L. Dunlap, and furnished at the lowest catalogue rates, making an estimated valuation of four hundred and fifty thousand dollars ($450,000). Titles to be perfect, and conveyance to the state to be made or caused to be made by the county of Champaign, upon the permanent location of the Illinois Industrial University upon the said grounds, so to be conveyed as aforesaid, and we hereby in our official capacity guarantee the payment of the said bonds and the faithful execution of the deeds of conveyance, free from all incumbrances, as herein set forth.

W. D. SOMERS,
T. A. COSGROVE,
C. R. MOORHOUSE,
Committee."

§ 13. The board of trustees shall, by and with the advice and consent of the governor and adjutant general, procure all such arms, accoutrements, books and instruments, and appoint such instructors, as may, in their discretion, be required to impart a thorough knowledge of military tactics and military engineering, and they may prescribe a uniform dress to be worn by the pupils of the University.

§ 14. That upon the organization of the board of trustees and appointment of said treasurer, and the filing with and the approval by said board of the bond of said treasurer, and all of said foregoing acts being duly certified to the governor, under the hand of said regent, countersigned by the said recording secretary, it shall then become the legal duty of said governor to deliver over to said treasurer the land scrip issued by the United States to this state, for the endowment of said University, and that thereupon it shall become the duty of said treasurer to sell

and dispose of said scrip at such time, place, in such manner and quantities, and upon such terms as such board shall, from time to time, prescribe, or to locate the same as said board may direct. Said treasurer being in all respects pertaining to the sale of said scrip, and the reinvestment of the proceeds received therefor, and the securities when reinvested, subject to such order and control of said board as is not inconsistent with this act and the act of congress providing for the endowment of said University.

§ 15. That all the right, title and interest of the state of Illinois in and to said land scrip, is hereby invested in the Illinois Industrial University, for the use and purposes herein contained; and said scrip shall be assigned to said University by the governor of the state of Illinois on each certificate, and attested by the secretary of state, under the seal of the state; and that the transfer of said scrip to purchasers by assignment on the back thereof, by the said officers of said University, under the seal thereof, in manner following, shall be deemed sufficient in law, to-wit:

State of Illinois, } ss.
Illinois Industrial University, }

For value received, the state of Illinois hereby sells and assigns to..........the within scrip, and authorizes..........to locate the same and obtain a patent on such location.

Given under our hands and the seal of the said University this..........of ....A. D. 186......

A. B., *Regent.*
C. D., *Treasurer*

Countersigned by
E. F., *Recording Secretary.*

§ 16. That upon said treasurer making sale of any of said scrip, he shall at once invest the fund so received, report the same to the said board, stating amount sold, price obtained and how the same was by him invested; which report shall be filed with the recording secretary, who shall transmit a copy of the same to the governor of said state, and he to the congress of the United States, in accordance with said act of congress.

§ 17. That the said board shall order upon its minutes which of the several kinds of securities mentioned in the fourth section of said act of congress said treasurer shall invest proceeds of sales in.

§ 18. The bond required to be given by said treasurer shall be conditioned for the faithful discharge of his duties as treasurer of the "Illinois Industrial University," and for any breach thereof suit may be instituted, in the name of the "Illinois Industrial University;" and it shall be deemed a criminal offense for any person or persons holding in trust any part of the funds of said University knowingly or negligently to misapply or misappropriate the same, indictable in any court having jurisdiction, in the same manner that other crimes are punishable, by fine or imprisonment, at the discretion of the court, according to the nature of the offense.

§ 19. This act shall be a public act and take effect and be in force from and after its passage.

Approved February 28, 1867.

AN ACT supplemental to an act entitled "An act to provide for the organization, endowment and maintenance of the Illinois Industrial University."

SECTION 1. *Be it enacted by the People of the State of Illinois, represented in the General Assembly*, That if the legal authorities of the county of Champaign shall not, by or before the first day of June, 1867, convey or cause to be conveyed, to the board of trustees of the Illinois Industrial University, by a good and unincumbered title, in fee simple, all the real estate mentioned and contained in the propositions of said county, and which real estate is described and set out in the act to which this act is supplemental, amounting to nine hundred and eighty acres of land, and if said county shall not also pay over and deliver to said trustees, by said day, all the bonds and other property offered by said county, mentioned in said act, then said board of trustees or a majority of them shall proceed without delay to permanently locate and establish said Industrial University in McLean, Logan or Morgan county; such county so selected shall in like manner be required in all things to fulfill and comply with the conditions and provisions of the offer heretofore made by such county, as an inducement for the location of said University in such county.

§ 2. This act shall be deemed a public act, and be in force from and after its approval.

APPROVED March 8, 1867.

UNITED STATES OF AMERICA, } ss.
State of Illinois. }

OFFICE OF SECRETARY.

I, Sharon Tyndale, secretary of state of the state of Illinois, do hereby certify that the foregoing are true copies of enrolled laws now on file in this office. In witness whereof I hereto set my hand and affix the great seal of the state, at the city of Springfield, this 12th day of March, A D. 1867.

SHARON TYNDALE,
Secretary of State.

LIST OF TRUSTEES.

PROCEEDINGS OF THE BOARD OF TRUSTEES.

SPRINGFIELD, ILLINOIS, *March* 12, 1867.

In pursuance of the foregoing laws, and in response to the subjoined letter of appointment from His Excellency, Richard J. Oglesby, Governor of Illinois, the Board of Trustees (thereby created), met in the hall of the House of Representatives in this city, on Tuesday, the 12th day of March, 1867:

THE GOVERNOR'S LETTER.

STATE OF ILLINOIS, EXECUTIVE DEPARTMENT,
SPRINGFIELD, *March* 1, 1867.

To ———

DEAR SIR:—You are hereby notified and informed that you have been appointed a trustee of the Illinois Industrial University, located in Champaign county. Your appointment will bear date March 1, 1867.

You are also notified that the first regular meeting of the Board of Trustees will be held in the city of Springfield, Illinois, on Tuesday, March 12, 1867, being the second Tuesday of said month, as provided by the act.

At this meeting the Board of Trustees, among other important duties to be performed, will be required to elect a Regent of the University. You are therefore respectively requested to attend said meeting, as required by law.

Yours, etc.,
R. J. OGLESBY,
Governor of Illinois.

As an *ex officio* member of the board, His Excellency, the Governor, called the meeting to order, and, directing attention to certain provisions of the law for the organization of the institution, said that it was made his duty to appoint one trustee from each Congressional District, thirteen in all, and five from each one of the three Grand Judicial Divisions of the State, making in all twenty-eight trustees to be appointed by him. In addition to these, the law also appointed four other *ex officio* members, to-wit: *The Governor,* and Superintendent of Public Instruction of the *State, the President of* the State Agricultural Society, and the

Regent of the University, when he should be elected, who was also to be President of the Board. He felt that the trust devolving upon them was a highly important one, and that the men who assumed it, and discharged it gratuitously, were serving their State in no mean capacity.

The Governor heartily indorsed the project, and wished it the utmost success, not doubting that it was destined to be one of the foremost institutions of our State at no very distant day. Discretion, labor and perseverance were necessary to give it a successful impulse. He thought the State might congratulate itself upon the appointment of such a board, and again hoped their labors would be crowned with eminent success.

A temporary organization was then effected by the election of His Excellency, Governor Oglesby, as chairman, and James Rea, Esq., as recording secretary.

The secretary then proceeded to call the roll of members as furnished by the Governor's private secretary, Col. George H. Harlow, as follows:

First Congressional District—David S. Hammond, of Cook county, present.

Second Congressional District—Luther W. Lawrence, of Boone county, absent.

Third Congressional District—Horatio C. Burchard, of Stephenson county, present.

Fourth Congressional District—John S. Johnson, of Hancock county, present.

Fifth Congressional District—Samuel Edwards, of Bureau county, present.

Sixth Congressional District—O. B. Galusha, of Grundy county, present.

Seventh Congressional District—M. L. Dunlap, of Champaign county, present.

Eighth Congressional District—Lemuel Allen, of Tazewell county, present.

Ninth Congressional District—Alexander Blackburn, of McDonough county, present.

Tenth Congressional District—M. C. Goltra, of Morgan county, present.

Eleventh Congressional District—J. P. Hungate, of Clay county, present.

Twelfth Congressional District—Willard C. Flagg, of Madison county, present.

Thirteenth Congressional District—A. M. Brown, of Pulaski county, present.

First Grand Judicial Division—L. B. McMurray, of Effingham county, absent.

Charles H. Topping, of Union county, present.

Thomas Quick, of Washington county, present.

Burden Pullen, of Clinton county, present.

Isaac S. Mahan, of Marion county, present.

Second Grand Judicial Division—George Harding, of Edgar county, present.

J. H. Pickrell, of Macon county, present.

Mason Brayman, of Sangamon county, absent.

J. C. Cunningham, of Champaign county, present.

J. W. Scroggs, of Champaign county, present.

Third Grand Judicial Division—John M. Van Osdel, of Cook county, present.

J. C. Burroughs, of Cook county, present.

S. S. Hayes, of Cook county, present.

Emery Cobb, of Kankakee county, present.

Robert Douglass, of Lake county, absent.

EX-OFFICIO MEMBERS.

His Excellency, Governor Oglesby, present.

Newton Bateman, LL. D., present.

A. B. McConnell, absent.

Making in all twenty-six members present, and five absent.

The Governor declared that a quorum of members being present the meeting was regular and lawful for the transaction of the business for which it was convened.

Mr. Dunlap moved that the board now take a recess till 2 P. M.; which, by request, was withdrawn.

Mr. Hammond moved that the present organization be considered as permanent until after the election of a regent; which, on being seconded, was put and carried.

Mr. BURCHARD suggested whether the next business in order would not be the locating of the institution.

Mr. HAYES rose to a question of order, and suggested that to the better carrying out of the spirit of the constitution, it would be proper, before proceeding farther with the business on hand, that the members of the board take the customary oath to preserve the constitutions of the State and Nation, against duelling, etc., and moved that the members present do now subscribe to the said oath; which was seconded and carried.

Police Justice, L. B. Adams, being present, was called upon, and administered the following oath, which was subscribed to by all the members present, with uplifted hands:

"You do severally solemnly swear that you will support the constitutions of the United States and of this State, and faithfully perform the duties of trustees of the Illinois Industrial University, to the best of your knowledge and ability. You do also solemnly swear that you have not fought a duel, nor sent or accepted a challenge to fight a duel, the probable issue of which might have been the death of either party, nor been a second to either party, nor in any manner aided or assisted in such duel, nor been knowingly the bearer of such challenge or acceptance since the adoption of the constitution, and that you will not be so engaged or concerned, directly or indirectly, in or about any such duel, during your continuance in office. So help you God."

Mr. BURROUGHS preferred that a Regent should be elected today, so that the scrip might be issued and located with as little delay as possible.

Mr. BLACKBURN thought that in view of the supplemental act "for the organization, endowment, etc.," of the University, there could be no doubt that the institution was located at Champaign, and thought the board should assume such a shape as to receive the property donated, before the Regent should be elected.

Mr. QUICK thought that the board should proceed at once to the election of a Regent.

Mr. BURCHARD wanted light as to the best man for the position, and therefore made a motion to adjourn till 2½ P. M., at which time the board shall proceed to the election of a Regent under the law.

An amendment was offered making the election of a Regent the special order for 2½ this P. M.

Mr. SCROGGS thought the *motion to adjourn* was before the *house, and that no discussion was in order.*

The Chair stated that the question before the house was whether the election of a Regent shall be fixed as the special order for 2½ this P. M.; which, on being put to the meeting, was carried.

A motion to adjourn, by Mr. GOLTRA, was withdrawn, to make way for nominations for the office of Regent of the University. Nominations for Regent being then in order,

Mr. DUNLAP put in nomination the Hon. DANIEL J. PINCKNEY, of Ogle county.

Mr. QUICK, in an eloquent speech, put in nomination Dr. JOHN M. GREGORY, of Kalamazoo, Michigan.

Mr. BURROUGHS nominated Dr. N. N. WOOD, of Morgan county.

Mr. BURCHARD put in nomination the Hon. J. L. PICKARD, of Cook county.

Mr. BURROUGHS withdrew the name of Dr. N. N. WOOD.

After which the board, on motion, took a recess till 2½ P. M.

AFTERNOON—FIRST DAY.

Board met pursuant to adjournment, when Mr. MCCONNELL took his seat, and subscribed to the foregoing oath.

Mr. BURROUGHS offered the following resolution:

Resolved, That sensible of our dependence on the Divine blessing in the great work in which we are engaged, it should be a standing order of this board to commence each day's proceedings by reading of the Word of God and prayer.

Which was seconded, and adopted unanimously; whereupon,

Mr. MAHAN was called to the platform and led in prayer to Almighty God, in the name of His Son, Jesus Christ, invoking His blessing upon the members individually, and upon the enterprise they were met to organize.

Mr. HAYES submitted the following series of resolutions for adoption:

Resolved, That the recording secretary, *pro tem.*, procure for the use of the board of trustees a well bound book, in which shall be entered of record, in a plain and legible hand, the proceedings of the present and succeeding meetings of this *board*.

2. That this resolution shall be entered upon said book as a part of the proceedings of this meeting.

3. That until a system of by-laws shall be adopted by the board of trustees, the rules and proceedings usually adopted by deliberative bodies, shall be and are hereby adopted for the government of this board.

4. That all resolutions when offered shall be reduced to writing, and sent to the desk of the recording secretary to be read, before action shall be taken upon such resolutions by the board.

Which were unanimously adopted.

The following was offered by Mr. FLAGG:

Resolved, That the Secretary of State be requested to have immediately printed for the use of this board two hundred copies of all the acts of Congress and of our State Legislature, relating to the Industrial University of this State.

Which was adopted, and the recording secretary ordered to furnish the Secretary of State with a certified copy thereof.

Mr. FLAGG offered the following:

Resolved, That the recording secretary *pro tem.*, be empowered to procure such blanks, rolls, etc., as may be necessary, for the use of the board.

Adopted.

Mr. BURROUGHS offered the following:

Resolved, That we now proceed to an informal ballot for Regent of the Industrial University;

Which was, on motion, adopted; but as several gentlemen desired to submit to the board certain statements touching the merits of their respective candidates, the vote by which it was passed was reconsidered and a motion to re-pass it was tabled.

Messrs. DUNLAP, QUICK, BURROUGHS and BATEMAN, severally spoke at length on the merits of the various candidates put in nomination.

Mr. DUNLAP offered the following; which was laid on the table:

Resolved, That any member of the General Assembly is competent to hold the office of Regent.

Mr. BLACKBURN offered the following:

Resolved, That a majority of the votes of all the members appointed as trustees, and of the members, *ex officio*, be required to elect any of the officers to be chosen by this board.

Adopted.

Mr. QUICK called up the resolution of Mr. BURROUGHS, which lay on the table, to proceed to an informal ballot for Regent.

Which was agreed to.

And the question being, "Shall the resolution pass?"

Mr. FLAGG moved to amend by striking out the word "ballot," and inserting in lieu thereof, the word "vote," which was lost, and the resolution adopted.

The Chair appointed Messrs. QUICK and BURCHARD tellers.

The Board then proceeded to an informal ballot for Regent, which resulted as follows: Gregory 16, Pinckney 5, Pickard 5, blank 1.

Mr. BLACKBURN offered the following:

Resolved, That we now proceed to elect, by formal ballot, a Regent for the "Illinois Industrial University."

Which was adopted.

Mr. BURCHARD withdrew the name of Hon. J. L. Pickard.

Mr. DUNLAP withdrew the name of Hon. D. J. Pinckney, which was subsequently put in nomination by Mr. PICKRELL.

The Board then voted formally by ballot, when the result stood —Gregory 22, Pinckney 4, blank 1.

On motion of Mr. PICKRELL, Dr. J. M. Gregory was declared unanimously elected.

Mr. BURROUGHS introduced the following:

Resolved, That a committee of three be appointed to arrange and bring to the notice of the Board the business requiring attention at this meeting.

Which was adopted, and, under its provisions, the Chair appointed Messrs. Burroughs, Burchard and Hayes.

Mr. BLACKBURN made a motion that the salary of the Regent be fixed at three thousand dollars ($3,000) per annum.

Mr. BURCHARD suggested that the motion of Mr. Blackburn be referred to a committee of three.

Mr. HAYES moved the postponement of the consideration of salary.

Mr. BLACKBURN offered as a substitute a motion that the question of the amount of the Regent's salary be referred to a committee of five, to be appointed by the Chair; which was adopted.

The Chair appointed Messrs. Blackburn, Dunlap, Goltra, Quick and Pickrell, as such committee.

TENURE OF OFFICE BY TRUSTEES.

Mr. Cunningham offered the following:

Resolved, That the Recording Secretary be instructed to prepare nine ballots marked *two* years, nine ballots marked *four* years, and ten ballots marked *six* years; that the Recording Secretary call the roll of members, and that as the names are called, the President draw a ballot, and that the ballot so drawn shall designate the term of service of such member on this Board.

To which Mr. Hayes offered the following amendment:

"Strike out 'ten' and insert *nine;* and insert after 'six years,' '*and one ballo; blank*.' Add at the close, '*the Recording Secretary shall prepare three ballots—one marked two years, one four years, and one six years, and the President shall draw one of them to designate the term of office of the member who shall have drawn the blank ballot.*"

The amendment was accepted by Mr. Cunningham, and the resolution, as amended, adopted. Whereupon the Recording Secretary prepared the ballots; which were drawn in the manner prescribed, with the following result:

Allen	4 years.	Hammond	2 years.
Burchard	4 "	Harding	6 "
Burroughs	6 "	Hayes	6 "
Blackburn	2 "	Hungate	6 "
Brown	2 "	Johnson	2 "
Brayman	6 "	Lawrence	4 "
Cobb	6 "	Mahan	2 "
Cunningham	4 "	McMurray	2 "
Douglass	4 "	Pullen	4 "
Dunlap	0 "	Pickrell	4 "
Edwards	2 "	Quick	2 "
Flagg	4 "	Scroggs	6 "
Galusha	4 "	Topping	2 "
Goltra	6 "	Van Osdel	6 "

Mr. Dunlap subsequently drew a two years ballot.

On motion, the Board took a recess till 7½ P. M.

EVENING SESSION.

Board met pursuant to adjournment, the Governor in the chair.

REPORTS OF COMMITTEES.

Mr. Blackburn, *from the committee to* whom was referred the *question of the Regent's salary, submitted* the following repot:

"*To the Board of Trustees of the State Industrial University:*

"The committee on salary respectfully report and recommend that the salary of the Regent of said University be fixed at the sum of three thousand dollars ($3,000) per annum.

A. BLACKBURN,
M. L. DUNLAP,
M. C. GOLTRA,
J. H. PICKRELL."

Mr. DUNLAP moved that Mr. Quick be appointed a committe on the part of the Board to inform Dr. John M. Gregory of his election to the Regency of the University, and the amount of salary offered; which was amended by the addition of the names of Mr. Dunlap and Dr. Bateman to the committee, and adopted, as amended.

Mr. BURROUGHS, on behalf of the committee to whom was referred the duty of preparing a routine of business, made the following report:

The committee to which was referred the duty of presenting to the Board subjects, which, by the terms of the bill establishing the college, or by the necessities of the University, will need the attention of the Board, beg leave to report the following order of business for each day's proceedings:

1st. The reception of communications.

2d. Reports of committees.

3d. Unfinished business.

They also report the following subjects as needing the attention of the Board at this session, and recommend that committees be appointed to consider and report on the same:

1st. By-laws for the government of the proceedings of the Board.

2d. The finances of the University.

3d. Election of Treasurer.

4th. Corresponding and Recording Secretaries.

The report was accepted.

The same committee also submitted the following supplemental report:

The course of study and the faculty of the University should receive attention at this meeting, and your committee respectfully suggest that a committee of five, of which the Regent shall be chairman, be appointed to consider these subjects and to report at the next meeting of the Board.

Which was accepted.

Mr. CUNNINGHAM offered the following:

"*Resolved*, That when this Board adjourns, it adjourn to meet at the building prepared for the uses of the University at Urbana, on the first Tuesday of May next. That Messrs. Dunlap, Cunningham and Scroggs be a committee to prepare a room

in said building and supply it with the necessary furniture for said meeting of the Board."

Adopted.

Mr. Burchard moved that a committee of three be appointed to prepare *by-laws*, and to report at the next meeting in May; which was agreed to.

The Chair appointed Messrs. Mahan, Allen and Brown, as such committee.

Mr. Cunningham offered the following, as suggested by the report of the committee:

Order of Business.

Resolved, That a committee of five, of which the Regent shall be chairman, be appointed by the chair, to prepare and report a course of study for the University, to the adjourned meeting of this Board to be held in May next, and also to suggest a faculty.

Carried.

Mr. Burroughs moved that the chair appoint a committee of five, to be styled the "Finance Committee," to serve for one year; which was adopted.

The Chair appointed as such committee Messrs. Cobb, Van Osdel, Cunningham, Galusha and Harding.

Mr. Dunlap moved to defer the election of the other officers of the Board until its next meeting.

Mr. Bateman opposed the motion.

Mr. Burroughs called for a division of the question, so as to vote first on the postponement of the election of Treasurer; which was carried; and the question being, "Shall the election of a Treasurer for the University be postponed till the next meeting?" it was decided in the negative; when the second division of the question—"Shall the election of Corresponding and Recording Secretaries be postponed till next meeting?" was put and also negatived.

Mr. Burroughs moved to postpone the election of Treasurer till half-past nine to-morrow. Lost.

Mr. McConnell moved to proceed to the election of Treasurer now.

Mr. Quick *moved to amend, by inserting "ten o'clock* to-morrow;" *which was agreed to, and the* motion put and carried

Mr. VAN OSDEL introduced a series of resolutions, looking to the establishment of a Polytechnic branch of the University at Chicago; which, by consent, were laid over till to-morrow.

Mr. HARDING moved that the Board proceed to the nomination of candidates for Treasurer; which was agreed to.

Mr. BLACKBURN put in nomination the name of Thomas A. Cosgrove, Esq., of Champaign, and accompanied the nomination by a lengthy petition from citizens of Champaign county, which was laid on the desk of the Recording Secretary.

Mr. CUNNINGHAM put in nomination the name of the Hon. Clark R. Griggs, of Urbana, and accompanied the nomination by a petition from citizens of Champaign county, in support of the same, which was also laid on the Secretary's desk.

Mr. McCONNELL put in nomination the name of John W. Bunn, Esq., of Springfield.

On motion, adjourned till 9½ o'clock to-morrow.

SECOND DAY.

MARCH 13, 1867—MORNING SESSION.

Meeting called to order by Mr. BURROUGHS, in the absence of the Governor, and Mr. Hammond appointed to the chair *pro tem.*

Prayer was offered to Almighty God, in the name of His Son, Jesus Christ, by Rev. Dr. BURROUGHS.

Board proceeded to the election of Treasurer of the University, as per special order.

Mr. CUNNINGHAM spoke at length in favor of the claims of Hon. Clark R. Griggs for the position, and concluded by calling for the reading of a petition from some fifty-two citizens of Champaign ounty, praying for his election, which lay upon the table of the Recording Secretary; which was read, as requested.

Mr. BLACKBURN followed in a speech in favor of Mr. Cosgrove, and closed by reading a petition numerously signed by citizens of Champaign county, in favor of his candidate.

Mr. McCONNELL spoke in favor of John W. Bunn, Esq., who, he said, had been Treasurer of the State Agricultural Society for many years, and who had always honored the warrants of the Society, whether it had any funds in his hands or not.

An informal ballot was then taken, resulting as follows:

Griggs	13
Cosgrove	4
Bunn	10

A motion was then made to proceed to a formal ballot for Treasurer.

Mr. QUICK moved to lay the motion on the table, in order to determine the value of the bond which the Treasurer should be obliged to give to the Trustees, conditioned to the faithful performance of his duties; which motion was carried.

The Governor arrived at this juncture, and assumed the chair.

The Chair announced the committee on course of study, and to suggest a faculty, as follows: The Regent of the University, Gen. Mason Brayman, S. S. Hayes, Willard C. Flagg and Dr. Newton Bateman.

Mr. COBB offered a resolution fixing the amount of the Treasurer's bond at $300,000.

Seconded.

Mr. BATEMAN moved to amend by striking out $300,000 and inserting in lieu thereof $100,000.

Seconded.

Mr. QUICK moved to amend the amendment by inserting $500,-000.

Seconded.

The several amendments were put to the meeting and lost, and the question recurring on the original resolution of Mr. Cobb, it was carried.

Mr. BURCHARD offered the following, which was adopted:

Resolved, That the Treasurer's bond, when executed, be referred to the Finance Committee, to report at the next meeting upon the sufficiency of the securities.

Mr. CUNNINGHAM offered the following:

Resolved, That at the earliest moment practicable, a good and sufficient fire and burglar proof safe be procured and placed in the office of the building hereafter to become the seat of the Illinois Industrial University, in which shall be kept all moneys and securities belonging to such Institution, while in the hands of the Treasurer.

Resolved, That the books and papers of each officer to be elected by this Board, together with all moneys and securities in the possession of the Treasurer, belong-

ing to the Illinois Industrial University, be at all times held by such officers open to the examination of any member of this Board.

Resolved, That the Treasurer of this Board be prohibited, under pain of removal from office, from depositing in any bank, banking house or place of deposit, other than as provided above, any part of the money, scrip or securities in his possession belonging to this University, or of loaning any part thereof, or of using on private account, or in any other manner, except as ordered by this Board.

Mr. BLACKBURN moved the reference of Mr. Cunningham's resolutions to the Finance Committee.

Mr. JOHNSON moved to lay the resolutions on the table; which was carried.

Election of Treasurer was proceeded with.

Mr. BLACKBURN withdrew the name of Mr. Cosgrove as a candidate.

The CHAIR appointed Messrs. Quick and Burchard tellers.

A ballot was then taken, resulting as follows:

Bunn	14
Griggs	11
Cosgrove	1

The Chair announced that no candidate having received the necessary number of votes (16) there was no election.

Second Ballot.

A second ballot was then taken, resulting as follows:

Bunn	15
Griggs	12

No choice.

Third Ballot.

Bunn	13
Griggs	14

No choice.

Mr. BLACKBURN moved to postpone the election of Treasurer until the meeting in May next.

Lost.

Fourth Ballot.

Bunn	13
Griggs	14

No choice.

Fifth Ballot.

Bunn	14
Griggs	13

No choice.

Sixth Ballot.

Bunn	15
Griggs	12

No choice.

A motion to take a recess till 2½ P. M. was put and lost.

Seventh Ballot.

Bunn	17
Griggs	10

The CHAIR declared John W. Bunn, Esq., as the duly elected Treasurer of the Illinois Industrial University.

On motion of Mr. CUNNINGHAM, the election of Mr. Bunn was declared unanimous, and the Recording Secretary, *pro tem.*, was instructed to inform him of his election.

On motion, the Board took a recess till 2 P. M.

AFTERNOON—SECOND DAY.

Board met, pursuant to adjournment.

Dr. BATEMAN, in the absence of the Governor, in the chair.

Mr. JOHNSON moved that the Board now proceed to an informal ballot for a candidate for the position of Corresponding Secretary.

Carried.

Mr. COBB put in nomination the name of Dr. J. W. Scroggs, of Champaign.

Mr. FLAGG that of O. B. Galusha, of Grundy county.

Mr. QUICK that of Rev. Isaac S. Mahan, of Marion county.

Mr. DUNLAP spoke at some length in favor of the claims of Dr. Scroggs.

Messrs. QUICK and BURCHARD were appointed tellers.

Informal Ballot.

Mahan	9
Scroggs	7
Galusha	6

Formal Ballot.

Mahan	10
Scroggs	7
Galusha	6

No choice.

Second Ballot.

Mr. Flagg withdrew the name of O. B. Galusha.

Mahan	13
Scroggs	10

No choice.

Third Ballot.

Mahan	13
Scroggs	11

No choice.

Fourth Ballot.

Mr. Burroughs, by permission, put in nomination the name of Willard C. Flagg, of Madison county.

Mahan	6
Scroggs	6
Flagg	11

No choice.

Mr. Quick withdrew the name of Mr. Mahan.

Fifth Ballot.

Scroggs	8
Flagg	16

The Chair pronounced Willard C. Flagg as duly elected to the office of Corresponding Secretary of the Illinois Industrial University.

On motion, Mr. Flagg's election was declared unanimous.

Mr. Quick said that as the law did not limit the term of office of the Corresponding Secretary, he would move that the term be two years.

Which motion, on being seconded, was put to the meeting and carried.

Mr. Flagg returned thanks for his election.

Mr. Quick moved that the Board proceed to the election of a Recording Secretary for the Industrial University for the term of two years.

Carried.

Nominations being in order,

Mr. McConnell nominated O. B. Galusha, and there being no other nomination, Mr. Galusha was elected by acclamation.

The Chair pronounced O. B. Galusha duly elected to the position of Recording Secretary for the period of two years from the *next meeting of* the Board.

Mr. PICKRELL offered the following:

Resolved, That the Finance Committee be a committee on titles, with power to employ a competent attorney, to examine titles of the real estate proffered to the Trustees of the Industrial University, and report to the next meeting of this Board.

Which, on motion, was adopted.

Mr. JOHNSON moved a reconsideration of the vote by which the next meeting of the Board was fixed to be holden on the first Tuesday in May next, and explained that his object in making the motion was to follow it with another, fixing the next meeting on the first Tuesday in June next.

The question on Mr. Johnson's motion was put by the Chair and declared lost.

POLYTECHNIC BRANCH AT CHICAGO.

Mr. HAYES called up from the table the resolutions offered by Mr. Van Osdel on the previous evening, for the establishment of a Polytechnic Department of the University at Chicago. The resolutions were read by the Secretary, as follows:

WHEREAS, In the act of the General Assembly establishing the Illinois Industrial University, it was contemplated that departments might be established at different points in the State, and particularly that there might be a Mechanical or Polytechnic Department in Chicago; therefore,

Resolved, That whenever the members of the Board, resident in Chicago, shall present to this Board of Trustees evidence that they have secured funds or reliable subscriptions to the amount of fifty thousand dollars, and buildings worth not less than fifty thousand dollars for the use of a Polytechnic College, and shall notify the Board of Trustees that such a College can be advantageously opened there, the Board of Trustees will proceed, upon the basis of such arrangements, to establish a Polytechnic Department at Chicago, which shall thenceforth receive the fostering care of the Board.

Resolved, That the Trustees resident in the Third Grand Judicial Division of the State, be and are hereby appointed a committee, with power to control and carry out the preliminary arrangements for this department.

The question being on the passage of the preamble and resolutions, as read by the Secretary,

Mr. HAYES offered the following substitute therefor:

Resolved, That a Mechanical or Polytechnic Department of the Illinois Industrial University be and the same is hereby established at Chicago, at such a point as a majority of the members of the Board of Trustees, residing in the Third Grand Division and First Congressional District, shall determine.

The said members of said Division and District are hereby authorized and empowered to receive contributions and subscriptions for said department, and, as a committee of the Board, to take all other necessary and lawful proceedings for the organization of said department, and the direction and control thereof.

The substitute was accepted by Mr. Van Osdel.

Mr. BROWN offered the following amendment:

Provided, That said branch be located as near the center of the city as possible.

Mr. QUICK also offered an amendment, which having been further amended by Mr. Burchard, read as follows:

Provided, That no part of the funds, scrip, or other property of the University, other than such as may belong to be received for such department, or be donated for its support or endowment, be used in the establishing or carrying on of said Mechanical or Polytechnic branch or Department.

Amendments accepted by Mr. Hayes.

On motion of Mr. QUICK, Mr. Hayes' resolutions, with the amendments thereto, were adopted,

Mr. GOLTRA moved that Judge Dummer, of Jacksonville, be designated as the advisor of the Finance Committee in the matter of bonds, titles, etc., which were to be passed upon by said committee.

Mr. DUNLAP thought the Finance Committee ought to be left free to select their own attorney, and moved to lay Mr. Goltra's motion on the table.

Which was carried.

Mr. BLACKBURN offered the following:

Resolved, That the Senators and Representatives of the State of Illinois in the Congress of the United States, be respectfully requested to use their influence to procure a change in the act donating lands to the states and territories for the purpose of establishing institutions for the benefit of Agriculture and the Mechanic Arts, so as to enable the Trustees of the Industrial University of the State of Illinois to locate the lands, or any part of them so granted, at their discretion, instead of selling the scrip issued therefor; and that the Governor, Superintendent of Public Instruction, and the President of the State Agricultural Society, be hereby appointed a committee, immediately to lay this resolution before said delegation, and urge the passage of an act before the adjournment of the present session. in accordance with this resolution.

Which, after some discussion, was adopted.

SALARY OF TREASURER.

Mr. BURROUGHS offered the following:

Resolved, That the large amount of business attending the custody and disbursement of the funds of the University, and also the proper disposal of the land scrip, and sale of lands which may be located, together with the general superintendence of the business of the University, will require the entire time and services of the Treasurer, and that in this view the salary of that officer be fixed at $4,000 per year, to commence as soon as the University is located and in readiness to commence business.

Which resolution was seconded, and the question being on its passage,

Mr. QUICK moved to amend by striking out "four thousand dollars," and inserting in lieu thereof *two thousand dollars.*

Mr. COBB moved to amend the amendment by striking out "two thousand," and inserting in lieu thereof "*fifteen hundred dollars.*"

Mr. DUNLAP moved the reference of the resolution of Mr. Burroughs, and the proposed amendments thereto, to the Finance Committee.

Which was carried.

BIENNIAL MEETINGS.

Mr. FLAGG offered the following:

Resolved, That the biennial meetings of the Board that seem to be designed by the act to provide for the organization and maintenance of the Illinois Industrial University, be held on the second Tuesday in March, biennially, dating from the first meeting of the Board.

Which was adopted.

Mr. FLAGG offered the following resolution:

Resolved, That a committee of three be appointed to prepare and present to this Board, at its next meeting, a design for the seal of the Illinois Industrial University.

Which was adopted.

The Chair appointed Messrs. Flagg, Hayes and Van Osdel such committee.

The Corresponding Secretary was recommended to consult the law for the organization, endowment and maintenance of the "University," for information touching his duties, and to enter as soon as practicable upon their discharge.

AUDITING COMMITTEE.

Mr. DUNLAP offered the following:

Resolved, That a committee of three be appointed to audit the expenses of the members of the Board in attendance at this meeting, and that they report at the next meeting of the Board.

Adopted.

The Chair appointed Messrs. Dunlap, Cobb and Edwards, such committee.

SALARIES OF SECRETARIES.

Mr. JOHNSON offered the following:

Resolved, That the *salary of the Corresponding* Secretary be $1,500 per annum, *and that of the Recording Secretary $1,000 per annum.*

Which, on motion of Mr. DUNLAP, was referred to the Finance Committee.

Mr. PICKRELL offered the following:

Resolved, That the Recording Secretary, *pro tem.*, be allowed the sum of ——— dollars for his services at this meeting, and that a warrant be drawn for the amount.

Referred to the Auditing Committee.

Mr. HAYES offered the following:

Resolved, That the Recording Secretary, *pro tem.*, prepare and engross in full the journal of the proceedings of the Board at this meeting, and that the same, when approved by the President, *pro tempore*, be signed by the officers and published in pamphlet form, as may be directed by His Excellency, the Governor, and that the Recording Secretary, *pro tem.*, mail a copy of said pamphlet to each member of the Board as soon as may be.

Adopted.

THANKS.

Mr. BURROUGHS offered the following:

Resolved, That the thanks of the Board of Trustees be respectfully tendered to His Excellency, Gov. OGLESBY, for the kind and courteous manner in which he has received the Trustees and presided over this meeting.

Adopted.

Mr. HAYES offered the following:

Resolved, That the thanks of the Board be tendered to JAMES REA, Esq., for the able manner in which he has discharged the duties of Recording Secretary, *pro tem.*

Adopted.

ADJOURNMENT.

Mr. JOHNSON moved that this meeting do now adjourn until the first Tuesday of May next, to meet at Urbana, in Champaign county.

Which, on being seconded, was put by the Chair and carried unanimously.

R. J. OGLESBY, *Chairman.*

JAMES REA, *Secretary, pro tem.*

PROCEEDINGS OF MAY MEETING---1867.

ILLINOIS INDUSTRIAL UNIVERSITY,
URBANA, *May 7th*, 1867.

The Board of Trustees of the Illinois Industrial University met, pursuant to adjournment, in the chapel of the Urbana and Champaign Institute, at 10 A. M.

The Governor being absent, the Board was called to order by the Recording Secretary.

On motion of Mr. CUNNINGHAM, Mr. Quick was called to the chair.

Meeting opened with prayer by Rev. Mr. Burroughs.

On the call of the roll, the following gentlemen were present, and answered to their names, viz:

Messrs. Allen, Brown, of Pulaski, Burchard, Burroughs, Cobb, Cunningham, Dunlap, Edwards, Flagg, Galusha, Goltra, Harding, Hayes, Hungate, Johnson, Mahan, McMurray, Pullen, Quick, Scroggs, Topping, Van Osdel, Gregory.

Twenty-two present and ten absent.

REPORT OF COMMITTEE ON REGENCY.

Mr. QUICK, chairman of the committee appointed by the Board, at its Springfield meeting, to inform the Regent elect of his election, reported as follows:

To the Board of Trustees of the Illinois Industrial University:

GENTLEMEN—The undersigned, committee appointed to inform Dr. John M. Gregory of his election, as Regent of said University, and of the amount of his salary, as fixed by the Board, respectfully report: That they have performed that duty, and that the Regent elect accepted the position to which he had been elected, and entered upon his duties on the first day of April, 1867.

Your committee further report that, after consulting the Regent, they deem his salary to be inadequate, and recommend that it be increased one thousand dollars per annum

Which is respectfully submitted.

Signed:

THOMAS QUICK,
M. L. DUNLAP,
Committee.

The ayes and noes being called for on the adoption of the report, were taken, and resulted in—22 affirmative votes, and one negative vote.

Mr. Quick introduced Dr. Gregory to the Board, who accepted his position, and took his seat as President of the Board of Trustees.

The oath of office was administered to the Regent by Hon. J. O. Cunningham.

L. R. McMurray also took the oath of office at this time.

Mason Brayman filed his oath of office as Trustee.

Mr. Cunningham moved that inasmuch as the minutes of the former meeting are published, they be adopted without reading.

Carried; and minutes adopted.

PROF. POWELL'S LETTER.

The President announced that the receiving of communications was in order, and introduced Dr. Sewall, of the Normal University, who read a communication from Prof. Powell, of Normal, in relation to his proposed expedition to the Rocky Mountains.

The letter was referred to a committee of five, who were appointed as follows:

Messrs. Burchard, Scroggs, Goltra, Brown, of Pulaski, and Quick.

Regent called for reports of committees.

Mr. Cobb, Chairman of the Finance Committee, reported that the committee had used due diligence to obtain an attorney to aid the committee, but had not succeeded until this morning.

The services of Thomas P. Bonfield, of Kankakee, have now been secured, who is now engaged in examining titles to the lands offered by Champaign county to the Industrial University.

TREASURER'S BOND APPROVED.

Mr. Cobb further reported that the Treasurer's bond had been examined and was considered ample.

The bond was read, and, on motion of Mr. Hayes, was approved.

Mr. Goltra moved that the bond be put on record.

The motion prevailed.

Mr. Van Osdel, from Committee on Seal, reported that the *Chairman was not* present, and asked further time.

Mr. Dunlap, of Local Committee, reported a bill of Wm. W. Strong, for furniture for University; which was referred to Finance Committee.

Dr. Scroggs, in behalf of the Congregational Society of Champaign, offered the basement rooms of their church for the use of the Board.

Mr. Hayes moved that the invitation be accepted, and that when this Board adjourn, it adjourn to meet at the Congregational Church.

The motion prevailed.

COMMITTEE ON BUILDINGS AND GROUNDS.

Mr. Goltra moved that a committee of five members, upon Buildings and Grounds, be appointed.

The motion prevailed, and the committee was appointed, as follows:

Messrs. Goltra, Van Osdel, Edwards, Dunlap, and Pullen.

Mr. Burchard moved that the Board adjourn, to meet at seven o'clock this evening.

The motion prevailed, and the Board was declared adjourned.

EVENING SESSION—MAY 7th, 1867.

Board met, pursuant to adjournment, in the Congregational Church.

Regent in the Chair.

Meeting opened with prayer by Rev. Mr. Stoughton.

Twenty-two members present.

President called for reports of committees.

1st. Finance Committee.

Mr. Cobb, Chairman of Finance Committee, read the report of Thomas P. Bonfield, attorney of the committee, respecting titles of real estate conveyed by Champaign county to the Board of Trustees.

Which report was ordered placed on file.

Mr. Burchard moved that Mr. Bonfield be instructed to personally examine all titles of the real estate, and make a full abstract and certificate of all titles to all lands *offered by* the county to this Board. Car*ried*.

Mr. BURCHARD, Chairman of Committee on Prof. Powell's le asked time (until morning) to report.

Which was granted.

The Committee on By-Laws, reported, in part, through its c man, Mr. Mahan, and asked further time.

Which was given.

REPORT OF FINANCE COMMITTEE.

Mr. COBB, of Finance Committee, further reported, as follo

The committee, believing that the titles to the lands offered by Champaign c are substantially perfect, are prepared to recommend the acceptance of such ti *Provided*, said county or its citizens shall execute to the University a bond i sum of $25,000, conditioned that no latent defect shall affect said titles.

Signed by the committee.

Mr. A. M. BROWN moved the adoption of the report.

Mr. JOHNSON moved to amend by referring the report bac the committee.

Mr. HAYES moved to amend by recommitting the report, instructions to the committee to ascertain and report, as earl convenient, the utmost amount of damage that might accrue f the defects in the titles referred to; and that they procure present to this Board a bond sufficient to indemnify the B against loss from such defects of titles.

Amendments accepted and report referred back to the commi

On motion of Mr. SCROGGS, the Board adjourned until o'clock to-morrow morning.

CHAMPAIGN, MAY 8TH—9 O'CLOCK, A. M.

Board of Trustees met, according to adjournment.

REGENT presiding.

Session opened with prayer by Mr. Rea, according to the of the Protestant Episcopal Church.

Present: Messrs. Allen, A. M. Brown, Burchard, Burrou Cobb, Dunlap, Edwards, Galusha, Goltra, Hayes, Hungate, J son, Lawrence, Mahan, McMurray, Pickrell, Pullen, Q Scroggs, Topping, Van Osdel, the Regent—22 members.

The minutes were read, but action thereon deferred.

Mr. LAWRENCE took the oath of office, which was administ *by Hon. A. M.* Brown.

REPORT OF FINANCE COMMITTEE.

Mr COBB, Chairman of the Finance Committee, reported as follows:

Your committee consider that sufficient assurances have been given by the Illinois Central Railroad Company that they will fulfill their agreement in regard to the fifty thousand dollars freight proposed in the offer of Champaign county.

Further: that Mr. Dunlap has filed with the Secretary a sufficient bond, covering the furnishing of two thousand dollars worth of trees and shrubbery.

Further: that the one hundred thousand dollars of Champaign county bonds are in the hands of the committee, to be delivered as soon as the location is made.

Further: in regard to salaries of officers, which were referred to this committee, we would report that, inasmuch as the duties of said Treasurer and Secretaries are, as yet, not defined, we would respectfully suggest that, for the present, we allow pay according to services rendered.

Which report was adopted.

Mr. BURROUGHS moved that the Finance Committee be instructed to examine the lands deeded to the Illinois Industrial University by Champaign county, and ascertain and report whether these lands correspond, in respect to quantity and location, with the offer of said county to the State. Carried.

EXPENSES OF MEMBERS AUDITED.

Mr. DUNLAP, Chairman of Auditing Committee, reported bills of expenses of members attending the meeting of the Board at Springfield, and bill of the Recording Secretary, *pro tem.*

Mr. BURCHARD moved to amend by adding the condition that the warrants shall not be drawn until there are funds in the treasury with which to pay them.

The amendment was lost, and the report of the committee adopted.

Mr. CUNNINGHAM, from Finance Committee, made a verbal and explanatory report upon titles of real estate. No action taken.

LOCATION OF THE ILLINOIS INDUSTRIAL UNIVERSITY.

A. M. BROWN read the following preamble and resolutions, and moved their adoption by the Board, viz:

WHEREAS, The county of Champaign has caused to be conveyed to the Board of Trustees of the Illinois Industrial University, by good and unincumbered titles, the building and grounds known as the Urbana and Champaign Institute, described as follows: Commencing at the north-west corner of the south-west quarter of the south-east quarter of section seven *(7), town nineteen* (19), range nine (9) east;

running thence east four hundred and sixty-two (462) feet; thence south seven hundred (700) feet; thence west four hundred and sixty-two (462) feet; thence north seven hundred (700) feet, to the place of beginning. Also, a part of the south-west quarter of section number eighteen (18), in said township, as follows: Beginning at the north-east corner of said tract; thence west eighty (80) rods; thence south one hundred and seven and thirty one-hundredths (107 30-100) rods; thence east eighty (80) rods; thence north one hundred and seven and thirty one-hundredths (107 30-100) rods, to the place of beginning. Also twenty-eight (28) acres off the north side of the south half of the south-east quarter of said section number eighteen (18). Also, the north half of the south-east quarter of said section eighteen (18). Also, the north-west quarter of section nineteen (19), in said township. Also, the north half of the south-west quarter, the south half of the north-east quarter, the north-west quarter of the south-east quarter, and the north-east quarter of the north-east quarter, of said section nineteen (19). Also, the south half and the south half of the north-east quarter of section twenty one (21), in said township; and,

WHEREAS, also, said county of Champaign has issued, under the forms of law, and delivered to said Board of Trustees, one hundred thousand dollars in the bonds of said county, due and payable ten years hence, bearing interest at ten per cent. per annum; and,

WHEREAS, also, the contract of M. L. Dunlap for the delivering, upon the order of the said Board, of fruit, shade and ornamental trees and shrubbery, to the value of two thousand dollars, has also been delivered to this Board; and,

WHEREAS, the Illinois Central Railroad Company has likewise assured to said Board the sum of fifty thousand dollars in freight over said road: and in consideration of the foregoing premises, therefore, be it

Resolved, That the Illinois Industrial University be and the same hereby is permanently located at Urbana, Champaign county, Illinois.

The ayes and noes were called on the resolution, which resulted in an unanimous affirmative vote—twenty four members voting.

On motion of Mr. HAYES, the Board excused the Finance Committee from further consideration of a bond of indemnity.

Moved that the Board take a recess until two o'clock P. M., when it shall meet in secret session. Carried.

AFTERNOON SESSION OF MAY 8TH.

Board met, as per agreement.

President called Rev. Mr. Burroughs to the chair.

Mr. FLAGG, Corresponding Secretary, appeared and took his seat with the Board.

On motion of Mr. SCROGGS, the regular order of business was suspended to allow time for special business.

The Finance Committee presented several communications relating to the subject of the scrip.

SALE OF SCRIP ORDERED.

Mr. A. M. Brown offered the following resolutions:

Resolved, That true policy requires that the land scrip under the control of this Board, or the greater part of it, should be sold at as early a day as practicable, and the proceeds thereof invested in interest-bearing securities; therefore,

Resolved, That the Treasurer be authorized and directed to sell not less than one hundred and eighty thousand (180,000) acres, and not more than three hundred thousand (300,000) acres, of the said scrip, for the best possible price: *Provided*, That he shall sell no part thereof at a less price than fifty-four cents per acre: *And provided, also*, That he shall make no sale without the advice and consent of a majority of the Finance Committee.

Mr. Quick offered the following as a substitute for Mr. Brown's resolutions:

Resolved, That the Treasurer be instructed to sell, with the advice and consent o the Regent and Finance Committee, scrip to the amount of one hundred and eighty thousand (180,000) acres of land, on the best possible terms, and at the earliest period practicable.

The substitute was adopted.

LOCATION OF LANDS AUTHORIZED.

Mr. Edwards moved the passage of the following resolution:

Resolved, That the Regent, Treasurer and Finance Committee be instructed to take immediate steps to acertain the practicability of obtaining timber lands easily accessible by water communication, and that if, in their judgment, a judicious location of such lands can be made, they be authorized to do so to the extent of one hundred thousand acres.

Mr. Galusha moved to amend by striking out the words "easily accessible by water communication."

Mr. Mahan moved further to amend by substituting the word "desirable" for the word "timber."

Amendments both adopted, and the resolution passed.

ADDITIONS TO FINANCE COMMITTEE.

On motion of Mr. Cobb, Messrs. Brayman and Gregory were added to the Fnance Committee.

REPORT OF COMMITTEE ON BUILDINGS AND GROUNDS.

Mr. Goltra, Chairman of Committee on Buildings and Grounds, reported as follows:

Your Committee on Buildings and Grounds would respectfully report:

That a principal front entrance should be *constructed* to the college building, with suitable *stone steps and portico to such front* entrance. Also, that a central

hall be arranged on the principal floor by the removing of a center wall in the principal story. Also, that two partitions be removed so as to enlarge the rooms on each side of the central hall, making them suitable for the principal office and reception rooms. The cost of this improvement will be about three thousand dollars, exclusive of freight on materials.

Your committee would further report, that a a sewer should be constructed from the building to the brook at or near Springfield street. The sewer, of brick-work, two feet in diameter, would cost about two thousand dollars.

Also, that it will be necessary to have considerable grading done about the building, at a cost estimated at one thousand dollars.

Also, that a plain fence be made, to inclose the premises around the building, twenty-three hundred (2300) feet, at a cost of three hundred and fifty dollars.

We also recommend the construction of an out-building, about twenty by forty (20x40) feet, of brick, two stories high, to contain the necessary privies, tool-house and work-shop, which may be used temporarily as a stable, etc. Such building would cost about fifteen hundred dollars.

RECAPITULATION.

Front entrance, etc	$3,000
Sewer	2,000
Grading	1,000
Fence	350
Out building	1,500
	$7,850

We also recommend the passage of the following:

Resolved. That it is expedient to employ a competent mechanic, to work and superintend improvements in and about the college building; and that the Regent, in concurrence with the Committee on Buildings and Grounds, be authorized to employ such mechanic, at a salary of not over one thousand dollars per annum.

M. O. GOLTRA,
SAMUEL EDWARDS,
B. PULLEN,
JOHN M. VAN OSDEL,
M. L. DUNLAP,
Committee on Buildings and Grounds.

The report of the committee was adopted.

On motion of Mr. COBB, J. M. Gregory was appointed the agent of this Board for the receiving of the freights donated by the Illinois Central Railroad Company.

REPORT OF COMMITTEE ON PROF. POWELL'S LETTER.

Mr. BURCHARD, Chairman of the Committee to whom Prof. Powell's letter was referred, reported the following:

To the Board of Trustees of the Illinois Industrial University:

Your committee, to whom was referred the proposition of Prof. Powell, and his letter in relation thereto, respectfully report:

That in the opinion of your committee, it is for the interest of the University to accept the offer of Prof. Powell. That the collections and specimens proposed to be sent us from his private cabinet, as well as those obtained from his proposed expedition, would be valuable, and more than equivalent for the proposed appropriation. But inasmuch as the donations and resources of this Institution have not, as yet, been converted into available funds, to enable us to make an appropriation for that purpose, we recommend that the Regent be authorized to confer with Prof. Powell, and, on behalf of the Board, to make some arrangement with him in regard to the expedition, and assure him of our desire to participate in its advantages, and willingness, hereafter, to contribute toward its expenses the amount proposed.

H. C. BURCHARD,
J. W. SCROGGS,
THOMAS QUICK,
M. C. GOLTRA,
Committee.

The report was adopted.

REPORT OF COMMITTEE ON BY-LAWS.

Mr. MAHAN, Chairman of Committee on By-Laws, reported a code of by-laws.

Mr. EDWARDS moved that they be read, and voted upon *seriatim*.

Mr. BROWN moved to amend by striking out the clause providing for the creating of a "working committee."

The amendment was accepted, the motion put and lost.

On motion of Mr. QUICK, the report was referred back to the committee, to be presented at the next meeting of the Board.

Mr. EDWARDS offered the following resolution, and moved its adoption:

Resolved, That the improvements recommended in the report of the Committee on Buildings and Grounds be authorized to be made by this Board, under the direction of the Committee on Buildings and Grounds, as soon as there are funds in the treasury for the same.

Adopted.

The Board then took a recess until half past seven o'clock this evening.

EVENING SESSION OF MAY 8TH.

Mr. DUNLAP presented the following resolution:

Resolved, That the Executive Committee consist of nine members.

The resolution was laid upon the table.

Mr. QUICK offered the following; which was adopted, viz:

Resolved, That no member shall, during the remainder of the session of this Board, be permitted to speak more than once upon any question, without leave of the Board; nor shall any member be permitted to speak longer than five minutes at one time.

Mr. Flagg, Chairman of Committee on Designs for Seal, reported four designs, numbered 1, 2, 3 and 4.

The report was accepted, and committee discharged.

Mr. A. M. Brown moved that the report of the Committee on Course of Study be made the special order of business for half-past eight this evening. Motion prevailed.

VOTE ON BY-LAWS RECONSIDERED.

Mr. Quick moved to reconsider the vote by which the report of the Committee on By-Laws was referred back to said committee. Carried.

Mr. Mahan, Chairman of the Committee on By-Laws, reported in part, stating that he was not prepared to make a full report.

Mr. Dunlap moved to lay the report upon the table; which was lost.

Mr. Burchard moved that the report be so amended as to provide for the appointment of a committee of five on the mechanic arts. Carried.

The report was then read, and acted upon *seriatim*, as follows:

STANDING COMMITTEES.

Sec. 1. Adopted.

The following standing committees shall be annually appointed, to consist as below specified:

1. An Auditing Committee—of —— members;
2. A Finance Committee—of —— members;
3. On Faculty, and Course of Study—of Regent and five members;
4. On Agricultural Department—of five members;
5. On Horticultural Department—of five members;
6. On Military Department—of five members;
7. On Mechanical Department—of five members;
8. On Buildings and Grounds—of Regent and five members;
9. On Library and Cabinets—of five members;
10. On By-Laws and Rules for the Board and the University—of Regent and three members.

Sec. 2. Adopted.

The auditing committee shall audit and authorize the payment of all the necessary bills for the running expenses of the University, and for all expenses authorized by

the Board. They shall make a report of their doings at every meeting of the Board, and shall have no powers except such as are herein specified.

SEC. 3. Adopted.

The finance committee shall have the general supervision of the financial affairs of the University, subject to the rules and control of the Board. They shall make to the Board, at the annual meetings, a report, showing the financial operations of the University for the preceding year; the condition of its treasury, its revenues and its funds, with an estimate of the probable receipts and expenditures for the next year, accompanied with such recommendation as they may deem proper.

SEC. 4. Referred back to committee for revision.

SEC. 5. Adopted.

The committee on rules and by-laws shall prepare and recommend, from time to time, by-laws for the government of the Board in its business, and rules for the management of all the departments of the University.

SEC. 6. Referred back to committee for revision.

DESIGN FOR SEAL ADOPTED.

Mr. PICKRELL moved to proceed to vote for designs by numbers, on roll call

Motion carried and vote taken, resulting as follows:

Design	No. 1	received	seven votes.
"	No. 2	"	one "
"	No. 3	"	four "
"	No. 4	"	ten "

Design number four was declared adopted.

Mr. A. M. BROWN presented, and moved the passage of the following resolution, which was adopted, viz:

Resolved, That the Auditing Committee shall have power to make all contracts and purchases that may be necessary for carrying into effect the orders made by the Board at its present session.

REGENT TO BE PAID MONTHLY.

Mr. COBB moved that the Regent be authorized to draw on the Treasurer monthly for his salary. Carried.

RESOLUTIONS ON SALARIES OF OFFICERS.

Mr. PICKRELL presented the following preamble and resolutions, which were adopted:

WHEREAS there have been and may still be elected members of the Board of Trustees of the Illinois Industrial University to offices, who shall receive annual or special salaries,

Resolved, That the salary of any member of this Board who may be elected to any office shall be referred to a committee, for action, of which said member shall not be a member.

Resolved, That we spread this upon the record as a standing rule of guidance and precedence.

On motion of Mr. FLAGG, the Auditing Committee was instructed to procure a seal for the use of this Board corresponding with the design adopted.

SPECIAL ORDER, 8½ O'CLOCK.

Hon. A. M. BROWN in the Chair.

The REGENT, Chairman of the Committee on Course of Study, made a full and very able report.

Mr. BURROUGHS moved that the report be recommitted to the committee, with instructions to procure the publication of the same, as embodying the aims and designs of this institution.

The motion prevailed.

Mr. BURROUGHS presented the following resolution, which was adopted, viz:

Resolved, That this Board, having at the present meeting had ample opportunity to see what has been done by the people of Champaign county to secure the location of the Industrial University, entertain a lively sense of the noble liberality of the contribution to this object, and also of the promptness and exemplary good faith with which the pledges made to the Legislature have been fulfilled.

The thanks of the Board are, also, due for the courteous hospitality with which the citizens of Champaign and Urbana have received and entertained the members of the Board. In all which, the Board welcomes the earnest of a spirit, which, in co-operation with the efforts of the Trustees, and the general good will of the people of the State, will, we believe, make the University as great a blessing to this community as they have hoped for, and as their enterprise and liberality deserve.

Mr. SCROGGS presented the following, and moved its adoption:

Resolved, That the thanks of the Board of Trustees of the Industrial University are due to Dr. James Rea for the able and faithful service he has rendered the Board in his reports of the minutes of said Board at its last session, and also for other favors.

The resolution was adopted.

Mr. BURCHARD offered the following resolution, which was adopted:

Resolved, That the thanks of the Board are tendered to the Congregational Society of Champaign, for kindly placing at our disposal the use of their Church edifice, during this session of the Board.

Mr. SCROGGS moved that a committee of three be appointed, who shall ascertain upon what terms the lands lying between the University building and the one hundred and sixty acre tract can be obtained, and report at the next meeting of this Board.

The motion prevailed, and the Committee was appointed, as follows:

Messrs. Cunningham, Scroggs, and Dunlap.

Mr. Edwards moved that the roll be called, and that members who intend to remain for to-morrow's session vote aye.

Carried, and vote taken, which resulted in eighteen members voting aye.

Dr. Scroggs moved to adjourn until to-morrow morning, at eight o'clock, at this place.

Mr. Quick moved to amend, as follows:

"We do now adjourn to meet on the tenth day of June."

Ayes and noes were called for, and taken on the amendment, resulting in four affirmative and sixteen negative votes.

The original motion prevailed, and the Board was declared adjourned until to-morrow morning, at eight o'clock, at this place.

CHAMPAIGN, MAY 9TH—8 O'CLOCK, A. M.

Board convened, pursuant to adjournment, Regent presiding, and meeting opened with prayer by Rev. Mr. Lawrence.

The following members were present, viz: Messrs. A. M. Brown, Burchard, Burroughs, Cobb, Cunningham, Dunlap, Edwards, Flagg, Galusha, Harding, Hungate, Lawrence, McMurray, Scroggs, Topping, Van Osdel, Gregory, and Pickrell—eighteen (18).

The minutes were read and approved.

MINIMUM PRICE OF LAND SCRIP.

Mr. Cunningham offered the following resolution, moving its adoption:

Resolved, That the Treasurer and Finance Committee be instructed to sell none of the land scrip at a less price than fifty-four (54) cents per acre.

Adopted.

The President announced that the reception of communications was in order; whereupon

Mr. Dunlap presented a communication from Professor Gow, which was referred to the Committee on Course of Study.

REPORT OF CORRESPONDING SECRETARY.

Mr. FLAGG reported the progress he had made in discharge of his duties as Corresponding Secretary; which, on motion of A. M. Brown, was approved, and the Auditing Committee instructed to settle for freight and expressage upon the books and pamphlets collected by the Corresponding Secretary for the Board.

EXECUTIVE COMMITTEE.

Mr. A. M. BROWN read a resolution creating an Executive Committee.

Mr. BURROUGHS offered the following as a substitute, which was accepted by Mr. BROWN, viz:

The Board shall appoint an Executive Committee, consisting of nine (9) members, who shall meet at the seat of the college at least quarterly, and oftener if they shall find it necessary, for the transaction of any business necessary to be done in the vacations of the Board. The said Executive Committee shall, for the purpose for which they were appointed, possess all the powers of the Board: *Provided*, that they shall not revise or change the acts of the Board, nor of any committee of the Board entrusted with special business; shall not sell real estate, nor the land scrip or bonds belonging to the University, without the consent, in writing, of a majority of all the members of the Board; and shall be strictly confined to such business as can not be left till the annual meetings of the Board. The committee shall hold their office till the annual meeting next after their appointment.

RESOLUTION ON TIME OF OPENING THE UNIVERSITY.

Mr. FLAGG offered the following resolution:

Resolved, That the best interests of the University require a postponement of the commencement of the principal courses of study until the year 1868.

The resolution was so amended as to be in the following words, viz:

Resolved, That the best interests of the University require a postponement of the commencement of the principal courses of study until the first Monday of March, A. D. 1868.

The resolution, thus amended, was unanimously adopted.

BUSINESS TRANSFERRED TO EXECUTIVE COMMITTEE.

Mr. A. M. BROWN read and moved the adoption of the following, viz:

Resolved, That the business intrusted to the Auditing Committee by previous orders of the Board, except the auditing of the Treasurer's accounts, be referred to the Executive Committee, and that the special committee appointed to report in relation

to the acquisition of the lands lying between the University building and the farm, be discharged; and that the duties assigned to them be referred to the Executive Committee.

The resolution was adopted.

ORDER FOR SALE OF CHAMPAIGN COUNTY BONDS.

Mr. BURCHARD offered the following resolution:

Resolved, That the Treasurer be authorized to sell, under the direction of the Finance Committee, not exceeding twenty thousand dollars of Champaign county bonds: *Provided*, the same shall be sold at not less than par.

Adopted.

Mr. BURCHARD also presented the following resolution, which was adopted, viz:

Resolved, That the Treasurer of the Board be instructed to invest the proceeds of the sale of land scrip in either United States Stock, stocks of the State of Illinois, or in county bonds, or any of them, drawing interest at not less than six per cent.

Mr. DUNLAP presented a resolution, as follows:

Resolved, That the Illinois Industrial University will be open to students of both sexes.

Which was referred to the Executive Committee.

PAYMENT OF EXPENSES OF MEMBERS.

Mr. A. M. BROWN read and moved the adoption of the following:

Resolved, That the members make out their accounts for expenses in attending this meeting, and transmit them to the Auditing Committee, upon whose approval the Executive Committee shall order their payment.

Which was adopted.

The following resolution, offered by Mr. BURCHARD, was laid upon the table:

Resolved, That the Committee on Course of Study and Faculty be authorized to select and engage the necessary professors and instructors for the University, their terms of engagement to commence upon the opening of the University for instruction.

PAYMENT OF SEXTON.

On motion of Mr. SCROGGS, it was

Resolved, That an order of four dollars be drawn on the Treasurer to pay the sexton for lighting the house, etc.

Mr. FLAGG moved that the subject of the annual report of the Corresponding Secretary be referred to the Executive Committee.

Which was so voted.

REGENT MADE CHAIRMAN OF EXECUTIVE COMMITTEE.

On motion of Mr. QUICK, the Regent was constituted Chairman and member of the Executive Committee.

APPOINTMENT OF MEMBERS OF EXECUTIVE COMMITTEE.

Mr. BURCHARD moved that we proceed to ballot for eight members of the Executive Committee.

On motion of Mr. SCROGGS, the appointment of the Executive Committee was referred to the Regent, who made the appointment, as follows:

Messrs. Cunningham, Scroggs, Dunlap, Cobb, Pickrell, Van Osdel, Mahan and Quick.

These appointments were approved by vote of the Board.

MEMBERS OF STANDING COMMITTEES.

The REGENT announced the names of members of committees, whose appointments, except those previously appointed, were confirmed by vote of the Board, as follows, viz:

Auditing Committee--Messrs. Lawrence, Edwards, Galusha, Burchard and A. M. Brown.

Finance Committee—(Previously appointed)—Messrs. Cobb, Van Osdel, Cunningham, Galusha and Harding.

Committee on Courses of Study and Faculty—(Previously appointed)—The Regent, Messrs. Brayman, Hayes, Flagg and Bateman.

Committee on Buildings and Grounds.—Messrs. Goltra, Brown of Chicago, Van Osdel and Johnson.

Committee on Agricultural Department—Messrs. Quick, Pickrell, Flagg, McConnell and McMurray.

Committee on Horticultural Department—Messrs. Pullen, Topping, Galusha, Hammond and Edwards.

Committee on Mechanical Department—Messrs. Scroggs, Goltra, Hungate, Topping and Van Osdel.

Committee on Military Department—Messrs. Brayman, Quick, Lawrence, the Governor and Allen.

Committee on Library and Cabinets—Messrs. Burroughs, Flagg, Bateman. A. M. Brown and Mahan.

Committee on By-Laws and Rules—Messrs. Mahan, Burchard and A. M. Brown.

The Board adjourned at 12 o'clock, M.

J. M. GREGORY, *Regent.*

O. B. GALUSHA, *Recording Secretary.*

REPORT OF COMMITTEE

ON COURSES OF STUDY AND FACULTY FOR THE ILLINOIS INDUSTRIAL UNIVERSITY.

Inasmuch as some time must necessarily elapse before the University can be properly equipped and prepared for opening, the Committee present, now, only the outlines and some of the general features of a plan of organization, hoping to be permitted, by fuller consultation with each other, and with eminent educators in other States, who are engaged in organizing similar institutions, to ripen their plans more fully before presenting them in detail. In laying the foundations of an institution which is to last through coming ages, and to affect all future generations, we have need to plan wisely. We must not expose ourselves, needlessly, to the inconveniences of changes, nor to suspicions of caprice.

THE GENERAL AIMS OF THE UNIVERSITY.

The aims of any institution necessarily control its organization. It should be fitted to its uses. The great general aims of the University are defined by the statutes under which it is established. Though not strictly confined by law to the objects proposed in the Congressional grant, we are yet bound to meet those objects fully and fairly. According to the language of the grant, "the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in order to promote the liberal and practical education of the industrial classes, in the several pursuits and professions in life."

Or, changing the order of statement, the chief aim of the University is, "*the liberal and practical education of the industrial classes*, in the several pursuits and professions in life;" and in order to this end, the University is "to teach such branches of learning as are related to agricultural and the mechanic arts, without excluding other scientific and classical studies, and including military tactics." The military tactics are required, and the scientific and classical studies are permitted. Such at least is the common construction of these clauses, though the language may not unreasonably be understood to imply that the latter studies *shall not* be excluded from the course.

The State law evidently aims to carry out the intention of the Congressional grant, and gives the trustees power "to appoint such professors and instructors, and establish and provide for the management of such model farms, model art and other

departments, as may be required to teach, in the most thorough manner, such branches of learning as are related to agriculture and the mechanic arts, and military tactics, without excluding other scientific and classical studies." This slight change of the order of the language of the Congressional enactment, gives additional emphasis to the opinion that it was intended to prohibit the exclusion of other scientific and classical studies." Under any construction the Legislature evidently intended to insist—as the law of Congress insists—on the industrial and military education, yet explicitly allowing the trustees to enlarge the scope of studies as they may see fit.

A clear insight into the real intention of the Congressional grant may be gained if we call to mind that the colleges, existing at the time of the passage of the act making this grant, were adapted only to fit men for the so-called "learned professions," and that the influence of these colleges tended to withdraw their students from the pursuits of industry. Congress therefore proposed to create a new class of colleges, which should train men for industrial pursuits, and help to turn some portion of the great currents of educated life into the channels of industry. They aimed to link learning more closely to labor, and to bring the light of science more fully to the aid of the productive arts. Any other interpretation of the design of Congress than this would involve an absurdity.

The Industrial College was not an expression of Congressional condemnation of the ordinary college, or opposition to it. A grant of a township of land in each new State had already provided for State Universities of the common sort. And besides these, rich and powerful seats of learning were every where fitting men for the great public fields of Law, Medicine and Theology. Congress only sought to extend still wider the benefits of science and liberal culture. They wished to establish other seats of learning, equally great and equally powerful, which should send scholars of high scientific attainments and broad and liberal culture, to the farms and workshops of the country.

And finally, as it was not the object of the Industrial Colleges to educate simply the sons of farmers and mechanics, so it was not their design to teach the mere manual arts of agriculture and manufacture. The college course can not replace the apprenticeship in the shop or on the farm; and if it could, a hundred such Universities as this could not train to their various trades, the future farmers and mechanics of this State. Some practice should, if possible, accompany the scientific study of the several arts, but the aim of this practice must be to insure the thorough comprehension of the principles involved. To teach the millions their trades, however desirable, is beyond our power. To so teach the few who will come and patiently complete their course, that they shall be thorough masters of practical science, and able in their turn to teach others, this is the worthy and attainable end of the University.

The committee profoundly appreciate and commend the far-reaching wisdom and beneficence of these aims of the Congressional grant, and would seek to carry them out to the very letter. They have discussed thus fully the intent of the Congressional enactment, in order to brush aside the false impressions which may have gained currency, and to bring out into clearer relief this grand idea of the Industrial University, as it lies involved in both State and National statutes—a true University, organized in the interest of the industrial, rather than of the professional pursuits, and differing from other Universities in that its departments are technological rather than professional—schools of Agriculture and Art, rather than schools of *Medicine and Law. Its central* educational courses, while equally broad and liberal

are to be selected to fit men for the study and mastery of the great branches of industry, rather than to serve as introductions to the study of law, medicine, or theology.

This broad idea of the Industrial University proceeds upon the two fundamental assumptions: First, that the agricultural and mechanical arts are the peers of any others in their dignity, importance and scientific scope: and, Second, that the thorough mastery of these arts, and of the sciences applicable to them, requires an education different in kind, but as systematic and complete as that required for the comprehension of the learned professions. It thus avoids the folly of offering as leaders of progress in the splendid industries of the nineteenth century, men of meager attainments and stinted culture, and steers clear also of that other and absurder folly of supposing that mere common school boys, without any thorough discipline, can successfully master and apply the complicated sciences which enter into and explain the manifold processes of modern agriculture and mechanic art.

Nor is it forgotten that man is something more than the artisan, and that manhood has duties and interests higher and grander than those of the workshop and the farm. Education must fit for society and citizenship, as well as for science and industry. The educated agriculturist and mechanic will not unfrequently be called to serve in Senate Chambers and gubernatorial chairs, and will need an education broader and better than the simple knowledge of his art.

The State has need every where, but especially in the center and at the head of the great industries, on which, as on corner stones, rest down her material progress and power, of broad-breasted, wise-hearted, clear-thinking men—men of rich, deep culture, and sound education.

And besides all this, it should be reflected that half the public value of a body of educated and scientific agriculturists and mechanicians will be lost, if they lack the literary culture which will enable them to communicate through the press, or by public speech, their knowledge and discoveries; or if they are wanting in that thorough discipline which will make them active and competent investigators and inventors, long after their school days are over.

Nor would we forget, nor attempt by a one-sided education to restrain, that free movement and versatility of American life and genius which leads so many of our more eminent citizens to the successive mastery of several vocations. Let us educate for life, as well as for art, leaving genius free to follow its natural attractions, and leading to talent a culture fitting it for all the emergencies of public or private duty. If some of our graduates shall quit, for a time, the harvest field for the forum, or prefer medicine to mechanic art, we shall hope they will demonstrate that, even in professional life, the education we give is neither inferior nor inadequate. And in riper years they will return to their first love, and bring their gathered wealth and honors to lay them in the lap of the agriculture and art we have taught them. Let the State open wide, then, this Pierian fount of learning. Let her bid freely all her sons to the full and unfailing flow: those whose thirst or whose needs are little, to what they require; those whose thirst and whose capacities are large, to drink their fill. Let the University be made worthy the great State whose name it bears; worthy the grand and splendid industries it seeks to promote; and worthy of the great century in which we live.

DEPARTMENTS AND COURSES OF INSTRUCTION.

Having thus defined the general idea and aims of the University, the Committee suggest the following enumeration of departments, with the courses of instruction in each:

I. The Agricultural Department—Embracing:

1. The course in Agriculture proper.
2. The course in Horticulture and Landscape Gardening.

II. The Polytechnic Department—Embracing:

1. The course in Mechanical Science and Art.
2. The course in Civil Engineering.
3. The course in Mining and Metallurgy.
4. The course in Architecture and Fine Arts.

III. The Military Department—Embracing:

1. The course in Military Engineering.
2. The course in Military Tactics.

IV. The Department of Chemistry and Natural Science.

V. The Department of Trade and Commerce.

VI. The Department of General Science and Literature—Embracing:

1. The course in Mathematics.
2. The course in Natural History, Chemistry, etc.
3. The course in English Language and Literature.
4. The course in Modern Languages and Literature.
5. The course in Ancient Languages and Literature.
6. The course in History and Social Science.
7. The course in Philosophy, Intellectual and Moral.

It may not be found feasible to develop all these departments at the outset, but ultimately, even others may be added to those here enumerated.

The following brief exposition of some of the principal courses will exhibit their general scope:

1. The course in agriculture proper may embrace the study of common tillage, arboriculture, fruit growing, cattle and sheep husbandry, veterinary art, agricultural chemistry, and rural engineering and architecture.

Its aim will be to give a practical knowledge of the various kinds of soils, their composition and improvement, by chemical or by mechanical treatment; the several classes of crops, with the preparation of the soil, seeding, cultivation and harvesting of each; the rotation of crops, and preparation and use of fertilizers; vegetable anatomy and physiology, with the classification, values, and laws of growth and culture of the cereals, grasses and other useful plants, together with general botany; fruit growing, and the several modes of propagation, and the production of new varieties; arboriculture, with the nature and value of the various species of ornamental, shade and forest trees, the propagation, growth and care of forests, their importance and value in a prairie country, in their effects upon climate, vegetation and health; animal anatomy and physiology, with a study of the breeds of domestic animals, and their values for the dairy, for fattening, for draught, and for wool or other products, and of the principles of stock-breeding; veterinary art, with the laws of feeding, care and training of the domestic animals; the apiary and poultry yard; agricultural chemistry, applied to the analysis of soils, fertilizers and food, etc.; entomology, especially including the useful insects and those injurious to animal life; meteorology and climatology; rural architecture and engineering, embracing the planning of farm buildings, and the laying out, draining and fencing of farms; political

economy, the laws of production, consumption and markets; real estate jurisprudence, the laws regulating the tenures and transfers of land, and the laws relating to rural affairs; the history of agriculture, and general views of the husbandry of foreign countries. To these studies should be added, either to prepare for the foregoing, or as necessary to complete education, courses in mathematics, language and literature, mental and moral philosophy, logic, history and science of government.

The instruction should be partly by text-books, and partly by lectures, enforced by observation and practice in the laboratory, and the various departments of the experimental farm.

2. The course of instruction in horticulture may comprehend most of the studies already described under the course in agriculture, omitting stock-breeding and veterinary art, and adding to the fruit-growing, the culture of the small fruits and culinary vegetables, and the culture of flowers; the construction and management of the hot-bed, the green-house, the grapery, the seed-plot and the nursery; landscape gardening, the laying out and ornamentation of public and private pleasure grounds, parks, cemeteries, etc. The methods of instruction should be like those in the department of agriculture.

3. The courses in mechanics, civil engineering and mining belong, properly, to the polytechnic school. All the fundamental sciences involved in them being taught at the University, these courses may also be developed there. The committee defer the delineation of a course of instruction in this department till the question of the extent of its means of development is settled.

4. Military tactics being specifically required by the act of Congress, the development of this department, to such an extent as may be found practicable, should be undertaken at the outset. While the effect of this department will be to scatter through the State a body of men, so far advanced in military art, that, in case of war, they will furnish skillful officers, ready to drill and lead the volunteer forces of the country, it is the opinion of many experienced educators that the introduction of the military drill and discipline is of positive value for their educating influence. They will materially assist in the government of the institution, and tend to form those habits of order and punctuality, for want of which so many educated men fail of usefulness and success.

It is strongly recommended by eminent military officers, that some simple and tasteful uniform be prescribed for all the students, as the law contemplates and provides; that the organization partake somewhat the military form, and that a daily drill be had in military tactics. The uniform would not be more expensive than ordinary clothing, and its use would repress extravagance in dress, and promote a feeling of democratic equality among the whole body of students. It will help, also, to stimulate the virtues of personal neatness and manly courtesy of demeanor.

By frequent rotations in office, and by making those eligible to office who merit it by proficiency in drill, and by good soldierly conduct, a sufficient stimulus would be gained to insure attention, and both the faculties of obedience and command would be developed. Students of the first year might be required to serve in the ranks and as non-commissioned officers, the higher officers being selected from the advanced classes. Some new drill might also be introduced for each advanced class, and thus the interest be sustained.

Besides the field exercises, some elementary text books should be used, and the students be required to read for recitations or for examinations on the general principles of military science.

It is hoped by the friends of military education that provision will soon be made by Congress for the detail of competent officers of the army to act as professors of military science in the colleges introducing it, and that in this way the university may be provided with instructors in this department.

5. The course in chemistry and natural science will embrace the study of analytical and practical chemistry, the analysis of soils, ores, minerals and organic bodies, and the applications of chemistry in agriculture and the arts of dyeing and bleaching, and the manufacture of sugar, salt, glass, etc. It will embrace, also, the more extended and practical study of mineralogy, geology, and natural history in general, with the arts of collecting and preserving specimens, and of arranging cabinets and conducting geological surveys.

6. The instruction in the department of trade and commerce will have for its aim to give students a knowledge of the principles of business, and of the customs and laws of trade—the collection, transportation, exchange and distribution of the valuable products of nature and art. Such knowledge will be eminently valuable to the educated farmer, and is of vital necessity to those who are to be employed in the great commercial branches of industry. The crowded rooms of the commercial schools, meagre and unscientific as the instruction of these schools often is, prove conclusively the felt need of such a department of instruction, and the university would be incomplete in its industrial courses if it should leave this important form of human industry unprovided for.

The studies in this department, in addition to such literary studies as are necessary for the requisite discipline and culture, and such knowledge of natural sciences as may be needful to an understanding of the origin, nature, quality and cost of the commodities, crude and manufactured, known to commerce, should embrace also political economy, the laws of production, exchange and consumption as they affect markets; the theories of banking, insurance, and foreign and domestic exchange; the laws governing importation and exportation, the several classes of imposts, duties, etc., and the theories connected therewith; commercial geography, with the staple commodities of the different regions and nations, their commercial condition, usages and markets; book-keeping in its several forms, commercial customs, papers and correspondence; and finally, commercial law and the history of commerce, with its growth and variations. Such knowledge, while it would make intelligent business men, farmers, merchants and manufacturers, and managers of the great business enterprises of the nation, would help to prevent those ruinous speculations and disastrous failures which spring as often from a pitiable ignorance of the great fundamental laws of trade, as from a willful violation of them.

DEPARTMENT OF GENERAL SCIENCE AND LITERATURE.

The several courses in this department make up the general educational or college course. Their main aim is to furnish such a liberal education as may best fit students either for the mastery of the special courses in the arts, or for the general duties of life. The final composition and adjustment of this central course will demand the most careful consideration. The conflicting views which prevail as to relative values of different branches of learning, and the consequent disposition to scout some as useless, and to magnify others as of overshadowing importance, make it requisite for us to recur briefly to some fundamental principles which ought to control our selection.

The knowledges considered as instruments of culture or education, may be broadly grouped into four grand divisions, as follows:

1. Natural sciences, or sciences of observation and experiment.
2. Mathematics, or the science of imagination and calculation.
3. Linguistic and philological sciences, or the sciences of formal expression.
4. Philosophical and speculative sciences, or the sciences of consciousness and reflection.

Each form of knowledge affects culture by two separate methods. First, by the kind and extent of the exercise its study affords the mind, and, secondly, by the exciting and stimulating effect of its proper ideas. Some studies are chiefly valuable for the former, and others for the latter use.

The natural sciences, or sciences of nature, embracing natural history, chemistry, natural philosophy, geology, physical geography and uranography, especially exercise and cultivate the powers of observation, classification and inductive reasoning.

The mathematical studies, embracing both pure and applied mathematics, exercise and develop the capacity to form and combine abstract conceptions, and cultivate the deductive reason. They also promote habits of mental concentration and continuity of thought.

Linguistic studies educate the discriminative judgment, and develop the power both of the expression and reception of thought. They train, also, the faculty of discursive reasoning, and help to give to the mental action a precision and clearness not otherwise to be gained.

The philosophical and speculative sciences, embracing mental and moral philosophy, and historical and social science, address themselves to minds already well matured, and powerfully exercise the reflective faculties. They especially develop the habit of looking for the fundamental and essential, in facts and things; of investigating the real nature and causes of social and vital phenomena, and of that reasoning from the contingent and the probable, which goes among us by the name of "common sense."

If we turn now to note the other educational force found in these several classes of knowledge—the stimulating power of their proper ideas—we shall find an equal diversity in the kind and degree of their influence; the philosophical studies being, to the majority of mature minds, the most stimulating, and the mathematical the least.

Natural science gives us a knowledge of physical facts and phenomena, and of the great forces and laws of nature underlying these. This knowledge has in all ages stimulated the most eager curiosity, and awakened the spirit of inquiry into physical causes. It has also excited the most wild and extravagant speculations.

The mathematics afford us only the knowledge of the abstract relations of quantity and number, and of certain formulas of analysis. It is by its problems that this science excites the mental activities. Its ideas lie mostly inert in the mind, except when wanted as instruments of calculation.

Language, like mathematics, is mainly concerned with relations; but it is with the relations of ideas and thoughts in all departments of knowledge. The study of language is the study of the connections, as well as of the expression, of thought. Grammar, as J. Stuart Mill has justly observed, is "incipient logic." But language is the *instrument* and the *store-house*, as well as the *vehicle* of thought. It is full of history, philosophy, science and poetry. It powerfully stimulates the thinking

processes by the facilities it affords for the manufacture as well as the commerce of thought.

But no knowledge so profoundly stirs and stimulates the human mind as the great questions with which philosophy and history have to do. These questions come down to us from those great central heights of truth, unattainable, it may be, in their heaven-piercing summits, but still irresistibly attracting all great thinkers, and calling for the mightiest efforts of the human intelligence in the struggle to master their mysterious and still unsolved problems.

It seems too obvious to need further argument that a true educational course must include these four classes of studies, and that if we would send forth a body of thoroughly educated agriculturists, to stand as the peers of the educated men found in other professions, we must give our students the benefits of a course with its full proportionate measure of each of these elements. "It is an ancient and universal observation," said that great thinker and teacher, Sir William Hamilton, "It is an ancient and universal observation, that different studies cultivate the mind to a different development; and as the end of a liberal education is the general and harmonious evolution of its faculties and capacities in their relative subordination, the folly has accordingly been long and generally denounced, which would attempt to accomplish this result, by the partial application of certain partial studies." Testimony could be multiplied on this point from the world's greatest thinkers.

It is not necessary that all the branches in each of these great classes of studies be included in the course. Provided that each class is represented in something like its due proportion, we are at liberty to select of two kindred studies, of nearly equal disciplinary power, that one which most conduces to the special uses we have in view. In making up a course for the Industrial University, we may wisely and safely depart from the common college curriculum; and, without losing any of its real advantages, may gain much special assistance for our industrial courses.

STUDIES OF THE UNIVERSITY COURSE.

In Physical Sciences, the course should embrace botany, zoology, mineralogy, chemistry, geology and physics, not in the stinted measure and nearly useless manner in which they are usually taught, but with such extent and thoroughness as shall give students a practical comprehension and knowledge of each. The scientific farmer or mechanic should be a good naturalist.

In Mathematics, beside algebra and geometry, the student of agriculture needs trigonometry and land surveying; while the mechanic and civil engineer require also analytical geometry, mechanics and the calculus. These studies, therefore, should find place in this general course.

In Language, the course should embrace a thorough study of our own language, its rhetoric and literature.

Of Modern Languages, it should include the French and German, taught with such thoroughness that the student may read them with ease, and converse in them with some facility. The scientific agriculturist ought to be able to avail himself of the fresh discoveries of the French and German men of science. He is shut out from the best scientific thinkers of the age, and from many of the best sources of knowledge, if he can not read the languages of France and Germany. And the prevalent use of these languages in our own country, among large masses of our population, gives to their study an additional value.

The Latin language, both because it enters so largely into our own and other modern languages, and because it is to such an extent the language of science, will demand a place in the course. As an instrument of linguistic culture, it greatly surpasses modern languages, and its literature is of perennial value. When well taught, no study more richly rewards the student. The Greek should be afforded, at least as an optional study, to all who desire to pursue it. It will never lose its value in the eyes of the highest grade of scholars.

Mental and Moral Philosophy, Logic, History, Political Economy, Civil Polity, and Constitutional Law, will all properly enter into the course as philosophical and speculative studies, and because of their high practical values.

A course, composed of these studies, reaching through four years, will fully equal, in its disciplinary power, the ordinary college course, and be of much more value to the student of the industrial arts.

It seems almost idle to say, we admit, many of these studies are not necessary to the mere practical farmer. Latin will not help a man to hold the plow, nor will mental philosophy teach how to fatten hogs. But, we reiterate, the Industrial University is not needed and was not founded for the common education of men, farmers or others. "The liberal and practical education" proposed by Congress will require all the amplitude of study here described.

It is not insisted that all students shall take this general course, though it is strongly recommended. Students may take up special courses without stopping to complete this, just as they may take a medical or law course at any other University, without first graduating from the college course.

The special courses in agriculture and the arts will comprehend many of the studies belonging to the general course, and they may be so arranged that a diligent student, of good abilities, while pursuing the regular University course, may also take up and carry forward one of the special technical courses. The studies of the University course being the minimum of study required to entitle the student to regular standing, it will be found that many students can perform, successfully, more than this minimum.

By further arranging the special courses so as to connect them with the last three years of the University course, and by bringing them, as far a practicable, into the fall and winter session, we may comply with the provision of the law, and also allow students of Agriculture or Horticulture, alone, to complete their special studies in a three years' course.

OPTIONAL AND SELECT COURSES.

The opinion gathers currency that students of mature age and experience should be permitted to enter our universities and colleges, and select for themselves such studies as they may need, and as they are qualified to pursue successfully with the regular classes in those studies. It may sometimes also occur that persons will desire to enter the university simply to attend some course of lectures, or to attain an insight into some agricultural or other industrial process, as the budding, grafting or pruning of trees, the management of a grapery, etc. Such students should be furnished with all the facilities consistent with the good order of the institution.

QUALIFICATIONS FOR ADMISSION.

The question of the qualifications required for admission to the University is one demanding careful consideration. These requirements should not be so high as to virtually exclude those who might successfully pursue the course of studies, nor so low as to permit those who are unprepared to profit by a residence at the Institution, and whose time would be uselessly wasted in the attempt to grasp studies beyond their comprehension.

The law prescribes that "no student shall be admitted to instruction in any of the departments of the University, who shall not have attained to the age of fifteen years, and who shall not previously undergo a satisfactory examination in each of the branches ordinarily taught in the common schools of the State." The committee understand this language, not as fixing definitely the qualifications for admission, but only as determining their lowest limit. The Trustees may require both a maturer age and a higher grade of scholarship, whenever, in their estimation, the interests of the State and of the University require it. It would certainly be better if students never entered college under eighteen years of age; but the average age of those applying for admission will doubtless be above this, without any special rule requiring it. Experience shows that students who enter college at a less age than that here indicated, are often injured by being thrown so early into the indiscriminate associations and powerful stimulation of college life. The University is the place for men rather than for mere boys.

It seems requisite that two different sets of qualifications shall be prescribed: the one for students who wish to pursue simply the studies of some select or partial course, and the other for candidates for the regular University courses.

1. QUALIFICATIONS FOR ADMISSION TO SELECT COURSES.

Students may properly be admitted to take some select course, on passing a thorough examination in the common school branches of reading, writing, arithmetic, geography and grammar, and on evidence of sufficient maturity and intelligence to pursue successfully the studies selected by them.

2. ADMISSION TO REGULAR UNIVERSITY COURSES.

While the Committee would wish to open the University as widely as possible to the youth of the State, they can not forget that its real utility will depend on establishing and maintaining a high standard of scholarship. As it can not legally do common school work, so neither ought it to undertake to do the work already provided for in the public high schools. It would prove a most sorry blunder if in our too eager desire to popularize the Institution, and under pretence of bringing its advantages within the easy reach of all, we should create a gigantic and expensive high school, and, having thus consumed our means, should fail to make any University at all. It is absolutely essential, if the University is to do the higher and scientific work required of it, that it shall leave the preparatory work mainly, if not entirely, to the public high schools and academies of the State; else it may fritter away its funds and its teaching forces, on the mere elementary work already sufficiently provided for, and leave undone all the great work which we ask at its hands for scientific agriculture and industrial arts.

The reasonable construction of the statute is, that while the University shall not comprehend the ordinary common school studies, it shall so arrange its terms of admission that the public schools may be able to meet them, and that there be left no unbridged chasm between the body of the State school system and the University at its head.

In the better class of public schools there are now taught, not only Grammar, Geography and Arithmetic, but also Algebra, Geometry, Natural Philosophy, History of the United States, and Human Physiology, and in very many of them the Latin language. All these may properly be prescribed, therefore, as preparatory studies for the University. They are all so elementary in character as to come within the easy comprehension of students under fifteen years of age; they all need to be studied as preparations for mastering the University course; and they may all be successfully taught in public high schools. In the Latin, the quality of the scholarship attained, rather than the quantity of the reading, may wisely be made the test, and the student should be admitted who can construe readily any passage in Cicero's Select Orations, or Virgil's Georgics and Æneid.

The preparatory course above indicated, differs from that ordinarily prescribed for admission to colleges, in the omission of the Greek language, and in the extension of the requirements in mathematics and other studies. It is believed that this variation will not only better adapt the preparation to the peculiar character of the University, but will adjust the University much more nearly to the ordinary course of studies now generally taught in our public high schools. These schools universally teach Geometry and Algebra; but only in a few cases teach Greek to any great extent. The grade of scholarship required for admission will thus be made as high as that required at other Universities, though made up of different elements. To make the work of the Industrial University thorough and complete, demands that the preparation for it shall be also full and sufficient.

The argument for an elevated standard of qualifications for admission gains great force from the fact, that until the student has made as much progress as this preparatory course requires, he has not usually formed his purpose and tested his strength and ability to pursue a course of liberal or scientific study. The history of preparatory schools is full of proof that many of those who set out for a College course stop short of the College doors. Science, like scripture, has its "stony ground" bearers, who at first receive the word with joy, but who, when the hot sun of hard study is up, wither away. If our doors must be held open to every half-taught youth who is seized with a sudden ambition to "go to the University," our halls will be flooded annually with fresh hosts of mere tyros, who will stay only long enough to manifest their unfitness for the place, and then go forth to shame the Institution whose students they will claim to have been; thus ruining its reputation, after helping to destroy or impair its usefulness.

Among this host of short-lived "students of the Industrial University" the State will look in vain for that long line of graduates—the ripe and scholarly leaders in her agriculture and her great industries—which she has hoped to see proceed annually from the University halls.

The Committee are confident that no person who properly considers the amount of more important work which the University has to accomplish, will wish to see its forces diverted to the teaching of these elementary branches which the high schools may properly claim as their own ground; and certainly no one who desires the success of the University, as a great scientific and industrial college, will wish to see students entering *its classes with less preparation* than is here prescribed.

It needs to be repeated that this does not forbid students of suitable maturity and experience to come to the University to take a few select studies, without passing an examination in Latin and the higher mathematics named.

HONORARY SCHOLARSHIPS.

The law for the organization of the University provides that "each county in the State shall be entitled to one honorary scholarship in the University, for the benefit of the descendants of soldiers and seamen who served in the armies and navies of the United States during the late rebellion; preference being given to the children of such soldiers and seamen as are deceased or disabled; and the Board of Trustees may, from time to time, add to the number of honorary scholarships, when, in their judgment, such additions will not embarrass the finances of the University; nor need these additions be confined to the descendents of soldiers or seamen. Such scholarships to be filled by transfer from the common schools of said county, of such pupils as shall, upon public examination, to be conducted as the Board of Trustees of the University may determine, be decided to have attained the greatest proficiency in the branches of learning usually taught in the common schools, and who shall be of good moral character and not less than fifteen years of age." These scholarships entitle the incumbents to free tuition for three years.

The Committee recommend that the Regent, in connection with the Superintendent of Public Instruction, prepare examination papers, and transmit the same to the County Superintendent of Schools in each county, who, with other examiners, appointed by the Regent and Superintendent, will see that the examinations are properly conducted, and will return the papers, with the written answers of the several candidates and with such testimonials as they may present, to the Regent, who shall determine on the papers and notify the successful candidates of their appointment.

A competitive examination, thus uniform in character and thus fairly conducted, can not but react with a most healthful stimulation upon the public school interests of the State; and this stimulation will be increased by a publication of the names of the schools in which the successful candidates were prepared, and the teachers by whom they were taught. In case any counties shall neglect to send students on their scholarships, the Regent may be authorized to award such scholarships, for the year, to suitable candidates from other counties.

CHARGES FOR TUITION, AND OTHER EXPENSES.

The Committee would rejoice if the condition of our funds and the provisions of the law would permit the University to be made free to all citizens of the State, and they cordially recommend that its tuition be made thus free at the earliest practicable moment; and that from the outset the charges be made as light as is consistent with justice to the Institution itself.

The charges in American Colleges range from a few dollars per annum to several hundreds. In Yale College the annual fees amount to $85. The annual fees at Harvard are $133. At the Michigan University each student pays a matriculation fee of $10, and an annual fee of $5. At the Michigan Agricultural College the tuition is free for citizens of the State. Students from other States pay $20 per annum. All students pay a matriculation fee of $5. The proposed fees for the Cornell University are $20 a year for tuition; matriculation fee $15.

The Committee recommend that the Academic year be divided into two semi-annual sessions, as nearly equal as may be, and that the tuition and other fees for each session be fixed at the following rates:

For tuition to students from other States, $10 per term..........................$20 per annum.
For incidentals, care and warming of public rooms, etc., $5 per term............ 10 " "
For room rent, $6 per term......... .... 12 " "

They recommend, also, that a matriculation fee of $10 be charged to each student on first entering the Institution. This fee is never charged a second time, but, once paid, entitles the student to all the privileges of membership at any time thereafter.

Students on the "honorary scholarships" will pay the matriculation fee and charges for room rent and incidentals, but will be charged nothing for tuition.

BOARDING DEPARTMENT.

The building is provided with the necessary rooms for a boarding department. It is believed that in a short time we may wholly dispense with this department, even if it must be opened at the outset. Suitable boarding houses will doubtless soon spring up in the neighborhood, and the rooms in the University building may be appropriated to more public and proper uses.

STUDENTS' ROOMS.

There are in the University buildings sixty-six rooms designed for students' dormitories, each dormitory being calculated to accommodate two students. These rooms are without furniture. It is customary to leave students to provide their own furniture, as they will ordinarily take better care of their own property than they will of that belonging to a public Institution.

MANUAL LABOR SYSTEM.

One of the most important and difficult questions concerning the organization of the University, is that of the introduction of the manual labor system. It is true that the attempt to connect manual labor with schools has, in many instances, failed; but the nature and extent of this failure have not been generally understood. It has not failed because the students were unwilling to work, nor because the work was injurious either to their health or culture. It has simply failed to pay. The labor of students was found unprofitable.

The high success and utility of the labor system, as practiced at the Michigan Agricultural College, has, in the minds of your committee, fully demonstrated its feasibility and value; and they would heartily recommend its adoption here, provided similar conditions can be secured. There, each student is required by law to work three hours a day, unless excused on account of sickness. The professors accompany the students to the garden or field, and participate in and direct the work, which is made to illustrate the principles taught in the lecture rooms. Wages, according to the value of the work done, not exceeding seven and a half cents an hour, are allowed the student, and he is thus enabled to pay a considerable part of the expense of his schooling by his labor. Even there the work has never yet proved remunerative to the institution, though it annually approaches nearer this result.

It should be added that the manual labor system, as practiced at the above named institution, has been carefully inspected by gentlemen sent from several of the Eastern States, and has been warmly commended, in their published reports, as eminently satisfactory and successful.

The chief advantages of the labor system are these:

1. It promotes the physical health and development of the student.

2. It cultivates habits of industry, and, keeping the student inured to muscular effort, renders his return to the farm, or other physical labor, natural and easy. This is a point of much importance, if we wish successfully to turn the tides of educated life into the industrial employments.

3. When made, as in the agricultural course, to bear upon the studies pursued, it creates a practical interest in, and comprehension of, those studies, which can not be obtained by mere abstract study.

4. When pursued, as here recommended, in the society of intelligent class-mates and teachers, and lighted with a knowledge of the reason of every process, it is not only pleasant, but comes to be seen as noble and dignified; and thus the sentiment of honor to labor is deeply implanted in the mind.

5. It aids the student to pay his own way, and cultivates in him the feeling of manly independence.

These considerations are so important that they incline us to recommend its introduction, even though it should fail to pay all the expenses attending it. But if proper care is taken not to establish too high a rate of compensation, the committee are not without hope that no loss need result, even if no profit is gained.

APPARATUS OF ILLUSTRATION AND INSTRUCTION.

Each department in the University will require, besides the general cabinets or collections, some means of illustration and instruction peculiar to itself. For general study of the natural sciences there will be needed full and well classified collections of specimens in mineralogy and geology, in botany and in the various branches of zoology.

The departments of agriculture and horticulture will require, in addition, cabinets of seeds, grasses, grains and fruits; models or drawings of farming and garden implements, of farm buildings, and plans of farms, gardens, celebrated parks, and landscape gardens, etc.; and specimens and drawings of various breeds of domestic animals.

The department of mechanics and civil engineering, will demand a cabinet of models and drawings of machinery, architectural plans and plans of roads, bridges and other structures, and specimens of building materials, as the various woods, marbles, granites and more common building stones.

The military department will require its specimens or drawings of the various kinds of arms and military structures, together with plans of celebrated battle-fields, sieges, encampments, etc.

The department of fine arts will require casts, photographs or engravings of the great master-pieces in art. These may be obtained at reasonable rates, and original drawings, paintings and sculptures will, in due time, be added. The healthful, refining and stimulating influence of such collections on the minds of the young, must be seen to be properly appreciated.

The common working apparatus of instruction must embrace a good set of chemical and philosophical apparatus. The prominence due to chemistry in such an institution as this, will demand at the earliest practicable day, a separate and suitable building for a chemical laboratory, such as exists at Harvard, Yale and Amherst, and at the Michigan University.

The experimental farms, orchards and gardens, with the several stock barns, yards, pens, etc.; the mechanic shops, tools and machinery; the military arms and parade grounds; the engineer's tools, and the model counting house, will furnish the

fitting apparatus for teaching in the several leading departments of special instruction.

As the collection of cabinets is a work of years, it is important that it begin at once, and that applications for duplicate specimens, casts, etc., be made as early as practicable, wherever they may be obtained. The friends of the University in the various sections of the State would doubtless donate many specimens, if a brief circular, containing a statement of our wants, and instructions for packing and forwarding, were sent out.

FACULTY.

The committee were also instructed "to suggest a faculty" for the University. In the entire work of organizing the institution, there is no more difficult or important part than this. On the character and ability of its faculty, will the character and success of the University depend, more than upon all other circumstances taken together. Buildings, cabinets, libraries and rich endowments will be all in vain, if the living agents—the professors—be not men of ripe attainments, fine culture and eminent teaching powers.

Numerous applications have already flowed in upon the committee, but the time has been quite too brief, since the last meeting of the Board, to allow any such careful and extensive inquiries as would justify the committee in presenting any names at this time. Self-nominated candidates will always be abundant, but the men we want will need to be sought for as with lighted candles. The incumbent of a professor's chair should be no ordinary man. In this, its chief seat of learning, in which it proposes to provide for the highest education of its sons, and from which, as a great center of science, it seeks to diffuse light to all the great fields of its industries, the State needs men of the highest type, as scholars and as men. The qualifications of every candidate for a professorship must be rigidly scrutinized without fear or favor; and none but men of tried and proven ability must be admitted to a place. Older and ordinary colleges may do with second rate men; this University can only succeed with the best men.

A good college professor should have the three-fold qualification of eminent and extensive scholarship, at least in his department; thoroughly tested ability to teach; and high-toned, gentlemanly character and culture. The first two are indispensable qualifications; the third will never be overlooked by those who have marked how inevitably and ineffaceably the teacher impresses his manners and habits upon his pupils. If culture is the better part of education, high-toned character and genuine courtesy of manner and feeling are the better part of culture.

The number of professors must depend upon the extent of the endowments and the consequent ability to pay salaries. Until the Trustees shall determine upon the disposition of the land scrip, and thus approximately determine the prospective extent of its funds, this question of the numerical force of the faculty must remain unsettled.

The corps of instruction may properly embrace four classes of teachers: 1st. *Professors*, or principal instructors in each department of study. 2d. *Assistant Professors*—younger, or less accomplished teachers, employed in sub-departments, or to aid in departments in which the work can not be fully done by one man. 3d. *Lecturers*, or non-resident Professors—men eminent in some speciality of art or science, who may be employed to visit the University at specified seasons, and give

courses of lectures. 4th. *Tutors*, or young men, employed temporarily to give instruction in the more elementary studies.

The Committee would indicate the following as among the more important departments or chairs of instruction:

1. The Professorship of Practical and Theoretical Agriculture.
2. " " of Horticulture.
3. " " of Analytical and Practical Mechanics.
4. " " of Military Tactics and Engineering.
5. " " of Civil Engineering.
6. " " of Botany and Vegetable Physiology.
7. " " of Zoology and Animal Physiology.
8. " " of Mathematics.
9. " " of Chemistry.
10. " " of Geology, Mineralogy and Physical Geography.
11. " " of English Language and Literature.
12. " " of Modern Languages.
13. " " of Ancient Languages.
14. " " of History and Social Science.
15. " " of Mental and Moral Philosophy.

In addition to these, the Committee would suggest the following lectureships:

1. The Lectureship of Veterinary Science.
2. " " of Commercial Science.
3. " " of Human Anatomy, Physiology and Hygiene.
4. " " of Constitutional, Commercial and Rural Law.

Several of these departments may, at the outset, be represented by the same man. The professor of Botany may also be professor of Horticulture; and the professor of Zoology may fill, likewise, the chair of Practical Agriculture. Civil and military engineering may be united in one chair; and the professor of Chemistry may teach also Mineralogy or Meteorology.

The professor of Practical Agriculture should be the superintendent of the experimental farm, with such foremen and other laborers under him as may be necessary to carry out his plans. The farm is his laboratory and apparatus of instruction, by which he illustrates the scientific principles and theories which he teaches, and demonstrates both the truth and the value of his doctrines. His plans for the treatment of each field and crop, and for the several experiments to be tried, should be submitted to the Regent and Faculty, and after careful discussion and final adoption by them, or by the Executive Committee, should be put on record as the settled plan for that season, to be carried out under the careful supervision of the superintendent, and its progress and results fully recorded in the farm record.

In like manner, the professor of Horticulture should be superintendent of the gardens and ornamental grounds, and should, in the same way, present to the Faculty for their discussion and approval, his plans for the management of such grounds and gardens. He, too, when necessary, may be aided in his work by a foreman and other laborers. The students, in their labors in the gardens or on the farm, will be under the guidance of the professors whose instructions those labors are designed to illustrate and apply; and thus the lecture room and the field practice will teach the same truths, and throw upon each other the light of a mutual illustration.

The professor of Mechanics may have under his care such shops as may be needed on the grounds for purposes of repairs, or of such new constructions of any kind as may be easily made. With a small steam or caloric engine as a motor power, there may be run a variety of common machinery, such as the turning lathe, circular saws, mills for grinding feed, etc., and threshing and other machines, which will enable the instructor in this department to furnish practical illustration of the principles of mechanics. The truth taught to the eye is much more easily understood and re-

membered than that which is stated in mere words. Every where the practical methods should supplement and impress the theoretical instruction.

At the Michigan Agricultural College the students repair the farm tools and make many of them. Several important improvements in farming implements have already originated there, though they have, as yet, no fully provided mechanical department. Students are also employed in the erection of new buildings as they are needed, and they are said to soon excel common workmen in the excellence of their work.

CONCLUSION.

In presenting this preliminary report, the committee purposely hold in reserve several points of much interest and importance, which they hope to be able to present finally in a much more definite and satisfactory form than can be done with the information now in hand. Maturer consideration than the time now allowed them has permitted, may also lead to some modification of certain of the points here presented.

Fully comprehending the great magnitude and the immeasurable importance of the enterprise which they are seeking to shape into life and power, they can only bespeak for it the wise support and the just forbearance of all good and intelligent citizens.

An Industrial University such as we are planning is, in a large part, without precedent or example. The field of its labors is as yet almost untracked in its widest stretches. The very classes for whom its benefits are designed, are as yet not half persuaded of the importance and real value of those benefits. The farmers and mechanics, accustomed to regard higher education as needful and desirable only for professional men, and almost wholly incredulous as to the utility of science in its applications to their work, will look with slow-coming faith upon a University which proposes to make farming a scientific employment, and to lift mechanics into a learned profession. They have, in many cases, yet to be convinced that a highly cultured mind may be linked to a brawny hand, and that a classical scholar may feel at home in a workshop; aye! and find use for all his scholarship and taste in the successful practice of his art.

But the age is propitious. The working masses of mankind are waking to their needs, and calling for light. The thunder of the machinery by the side of which they toil, and the magic power of the new processes of arts which they daily employ, have roused the long slumbering power of thought. Brains are coming into use and honor in all the fields of human labor, and brains will speedily demand light and knowledge. In an age of learning, the farmer and the mechanic will soon come to covet the rich heritages of science for their sons. Already the children of the laboring classes are crowding the public high schools. They will not stop there. The University lies the next step beyond. They will crowd to its doors; and soon will begin to issue from its halls that long column, with its yearly additions, of graduates with broad brows, and science-lighted brains, bearing back to the farms and the workshops an intelligent skill and power, to invoke new and unwonted fruitfulness from the soil and from the mechanic's art. "If I had fifty sons," said a farmer who had reluctantly permitted his eldest boy to take a course at an Agricultural College, and now brought his youngest to the same College, "If I had fifty sons they should all go to this College, for my boy, who graduated here, farms so much better than I ever did, skillful as I thought myself, that he is getting rich from his half of the crops he raises on my land, and I live like a prince on the remainder."

And the light of high and classic learning will be found as beautiful and becoming when it shines in an educated farmer's home, as when it gilds the residence of the graduated lawyer or physician. Rich libraries are already seen in the houses of some of our leading agriculturists, and no one has found that they hinder the growth of harvests, or unfit the hand of the reaper. When our Industrial University shall have come fully into its work, these libraries will be increased in number, and there will gather around the firesides in our farm houses, and in the homes of our master mechanics, groups of cultivated and intelligent people, the peers in knowledge, refinement and power of the best and bravest in the land.

And what richer growths shall yet start from these magnificent prairies to repay the farmer's toil, and what more splendid achievements shall yet spring from our myriad-handed mechanic art—what more beautiful bloom in our gardens, and more delicious fruits from our orchards—what more tasteful and convenient homes from our architecture, and what grander and more abundant products from our multiplying manufactories—what nobler forms of civilization to grace our free institutions, and what better types of manhood to tell of the blessings of liberty and learning, when education shall have fully achieved this last triumph, and carried her victorious banner of light down into the fields where the toiling millions of mankind must still, by the stern but beneficent ordination of Heaven, "eat their bread in the sweat of their brows."

J. M. GREGORY,
NEWTON BATEMAN,
MASON BRAYMAN,
S. S. HAYES,
WILLARD C. FLAGG,
Committee.

NOTE—TIME OF OPENING.

It was the earnest desire both of the Trustees and of the Regent to open the University for students, as early at least as next September; but a careful consideration of the character and extent of the preparations necessary to be made, in order to the successful inauguration of an enterprise of such magnitude and importance, convinced the Board of the necessity of some delay. It was accordingly voted that the opening be deferred till the *first Monday in March*, 1868.

It was found that important alterations were needed to be made in the University building, requiring several months for their completion; the University grounds, which are a portion of an open and unsettled prairie, were to be graded, and this grading will leave the soil naked, to be turned into an expanse of mud by the autumnal rains; fences were to be built, walks laid, sewers constructed, out-houses erected, blackboards and other apparatus and furniture to be made or purchased, and the institution to be equipped for service.

Financial considerations of much importance also forbade haste. The sale of the scrip, which could not be made for several weeks, was uncertain. No interest would accrue on the fund still the first of May, 1868, and the expense of the repairs and equipments, together with nearly the entire amount for salaries and current expenses would have to be taken from the principal of the University fund, thus seriously diminishing the means needed for the permanent support of the Institution.

But even if these difficulties could be overcome or safely submitted to, the selection of a faculty could not be wisely made in a time so limited. To ripen the working plans, to select and appoint a suitable faculty, to allow the professors, when chosen, time to close their present engagements, and to remove their families and effects to the seat of the University, to properly advertise the opening, and to diffuse every where through the state clear and definite information of the proposed courses of instruction and conditions of admission, to carry out the plan for the examination of candidates for the honorary scholarships, and to do all this well and thoroughly, required much more time than could be gained in a single summer. In an institution which is to last through ages, the delay of six months in the opening is of little consequence if it avails to make that opening successful and auspicious.

It was believed that the opportunity afforded by this delay to the Regent to visit the different counties of the State, and, by public addresses and personal interviews, to diffuse information concerning the plans and purposes of the University, would pave the way for a much more successful inauguration of its career.

PROCEEDINGS OF NOVEMBER MEETING—1867.

URBANA, *November* 26, 1867.

The Board of Trustees of the Illinois Industrial University, met at the University building, in the Regent's office, at 9 o'clock, A. M., November 26th, 1867, pursuant to the call of the Regent and the Executive Committee.

The meeting was opened with prayer by the Regent.

Upon the roll being called, nineteen members were present and answered to their names. Other members arrived later, making in all twenty-two present at the meeting.

The absentees were, Brown of Chicago, Hammond, Hungate, Pullen, VanOsdel, and the Governor.

Reports of committees were called for.

J. W. SCROGGS, Secretary of the Executive Committee, made a full report, by reading the record of the acts of said committee to this date. Action upon this report was deferred.

The REGENT called for the report of the Auditing Committee.

Mr. LAWRENCE, Chairman of said committee, reported, informally, that he had corresponded with members of his committee, in reference to auditing the accounts of expenses of members of the Board, and had, with their consent, forwarded these accounts, with his approval, to the Regent.

The REGENT called for the report of the Finance Committee.

Mr. COBB, Chairman, made a full report of the action of said committee to this date, as follows:

To the Board of Trustees of the Illinois Industrial University:

GENTLEMEN—The Finance Committee are only required by the statute to report at the regular annual meetings. But, thinking that a brief statement, upon some of

the more important matters referred to us, might be of interest to you, we herewith submit the following:

1. Sale of Scrip.—As per your instructions, the Treasurer, Regent and Chairman of the Finance Committee advertised and sold 180,000 acres of the scrip, realizing therefor $101,764 50.

This sale, being considered favorable at the time, induced the Executive Committee to recommend to the Trustees the sale of an additional 100,000 acres.

Your approval, in writing, having been obtained, the sale was conducted in the same manner as the first, realizing therefor the sum of $58,427 91.

2. Funds for Current Expenses.—In accordance with a resolution offered by Mr. Burchard, at our last meeting, the Treasurer sold twenty thousand dollars ($20,000) of Champaign county bonds, using money obtained from the sale of scrip for the purchase of the same; thereby keeping our one hundred thousand dollars of Champaign county bonds good.

3. Location of Scrip.—A resolution of the Board instructed our Committee to take immediate steps to ascertain the practicability of obtaining desirable lands, and if, in their (our) judgment, a judicious location of such lands can be made, they (we) were authorized to locate the same to the extent of one hundred thousand acres. The Committee having become convinced, after extensive inquiries, that excellent lands could be obtained, instructed the Regent and their Chairman, with such other Trustees as they might call in to aid them, to proceed to make locations in the four States of Minnesota, Iowa, Kansas, and Nebraska.

The Regent and Mr. Goltra proceeded to Minnesota, and, after a careful inspection, located about sixteen thousand acres in that State.

At a later date, Mr. Goltra proceeded to Nebraska, and located about nine thousand acres; making in all, located to this time, something over twenty-five thousand acres.

Mr. Goltra expresses his opinion that thirty thousand acres, in addition, can be advantageously located during the next four months; and that, by taking a little further time, the balance, to make the entire amount of one hundred thousand acres, can be well located.

It is believed that the lands already obtained will, within a few years, bring from three to five dollars per acre.

As soon as the location of the 100,000 acres is completed, a descriptive catalogue should be issued and measures taken to secure an early sale.

Upon application to the Regent for a detailed statement of the expenditures thus far, he furnished the following, which, upon examination, seems to be correct, and in accordance with instructions of the Board and Executive Committee:

Expenditures.—The total expenditures made thus far, for all purposes, is twenty-five thousand six hundred and twenty-two dollars and thirty-five cents ($25,622 35). Some of the warrants embraced in this amount are, probably, still outstanding, and may not, therefore, appear in the Treasurer's statement.

Of these expenditures, much the larger part, viz: fourteen thousand and eighty-two 35-100 dollars, ($14,082 35,) was paid for additional grounds. The other expenses were as follows, viz:

For expenses of meetings of boards and committees.........	$1,032 30
For grading grounds..	902 32
For furniture, stationery, printing, etc....................	690 00
For cut stone, lumber, labor, etc..........................	3,053 07
For salary of Regent.......................................	2,333 33

For expenses attending sale of scrip..........	$385 55
For insurance..	132 18
For cabinet, Powell's expedition............................	500 00
For express charges on books................................	61 25
For fees and expenses locating scrip.....................	24 50

There are outstanding bills and contracts for labor, material and lands, which will require, perhaps, three thousand dollars more.

In order to make an estimate of our expenses for the coming winter, we would respectfully ask Chairmen of committees, or members of the Board, to hand in accounts or unpaid bills at once.

Mr. PICKRELL moved that the bills presented at this meeting be referred to the Auditing Committee.

The motion was sustained.

Mr. BRAYMAN moved that the report of the Finance Committee be laid upon the table, to be taken up for action at some future time during this meeting.

Carried.

Mr. GOLTRA, Chairman of the Committee on Buildings and Grounds, asked further time to report; which was granted.

REPORT OF COMMITTEE ON AGRICULTURAL DEPARTMENT.

Mr. QUICK, Chairman of Committee on Agricultural Department, presented the following report:

The Committee on Agriculture beg leave to submit, for the consideration of the Board of Trustees, the following, as the result of their deliberations since the May meeting, touching the condition and management of the University lands:

1. The *present extent* of our grounds, including the purchases made by the Executive Committee, exclusive of the University lot, is about (1000) one thousand acres: nearly 200 adjoining the University lot, 410 in the Busey farm, and 400 in the Griggs farm.

2. There will be needed, for the University work, only about 600 acres; the 35 acres of the new purchase for horticulture, 160 acres for the experimental farm, and the 410 for the stock farm, tree planting, etc.

3. The Griggs farm should be sold as soon as it can be done wisely, and the proceeds should be sacredly kept to reimburse the permanent fund for the sums used in the purchase of additional lands.

4. The Horticultural Department may be allowed twenty acres, from the one hundred and sixty, for orchards.

5. The remainder of the experimental farm should be put at once, the coming season, under active cultivation, both to bring it into a higher state of improvement, and to ascertain carefully its soil and topography, preparatory to the subdivision into proper fields, for the future work of the Agricultural Department.

6. The stock farm (Busey place) may also be taken into the care and supervision of the University officers, in order to secure on it a cultivation which may tend to its improvement, and leave at our disposal such part of it as may be found necessary

to occupy. Such fields as are not wanted for the year's work may be rented, under such conditions as to use as may seem necessary.

7. To carry on the work on the farm, it is desirable that there be secured the services of a competent head farmer, who, under the direction of the Regent and Professor of Agriculture, shall oversee and carry forward the farm work.

8. The committee recommend the appointment of ——— as head farmer, with a salary of $——— per annum.

9. It is desirable, also, to secure, as early as may be, two or three good farm hands, to be permanently employed. These, with the students (if the students are to labor on the farm), will be able to do the work on the farm.

10. There will also be needed for the farm two or three horse teams, and the necessary tools for the working of the farm. These the Executive Committee may be instructed to purchase, when they are needed; or, in the absence of the Executive Committee, the Regent may direct the purchase of tools which may be wanted.

11. The Regent may be directed to secure, with the aid of the Faculty, at as early a day as practicable, a complete topographic survey of the farms, and an analysis of the several soils, and present to the Board a map of the farms, with a plan for the subdivisions, roads, building sites, etc.

12. In the absence of suitable barns and buildings, for the care of fine stock, it is desirable to confine the purchases of stock, the first year, to such animals as may be needed for economy on the farm and in the boarding hall.

In the mean time, the Faculty should be requested to act in conjunction with the Farm Committee, in preparing a thoroughly digested report of the character and extent of the future Stock Department, and of the barns and buildings needed for its accommodation.

All of which is respectfully submitted.

[Signed] T. QUICK,

Chairman of Com. on Agricultural Department.

On motion of Mr. CUNNINGHAM, the report was laid upon the table, to be taken up for consideration in its due order.

The report of the Committee on Horticulture was called for, but the Chairman was not present and no one responded.

Upon the call for report from the Committee on Mechanical Department, Mr. Scroggs, Chairman, stated that he had not conferred with members of the Committee, and was unable to report.

Gen. BRAYMAN, Chairman of Committee on Military Departments, asked further time, to enable him to complete his report; which was granted.

Mr. BURROUGHS, Chairman of Committee on Library and Cabinets, asked the same favor; which was given.

Also, Mr. MAHAN, Chairman of Committee on By-Laws; the same.

PURCHASE OF ADDITIONAL LOTS.

Mr. SCROGGS, Chairman of the Committee of the Executive Committee, on the purchase of additional lots, reported as follows:

The Committee appointed to inquire into the feasibility of the purchase of additional lots to the Illinois Industrial University grounds, would beg leave to respectfully submit the following report:

One entire tier of lots upon the west side of said grounds has been purchased, and the deeds have been made out, and are now ready for delivery whenever the money shall be paid for the same, except two, viz: Nos. 140 and 173. On account of a little delay on the part of the agent for the sale, lot No. 140 has not been fully secured by deed. The temporary absence of Mr. Sherfy has also delayed the transfer, by deed, of lot No. 172. The lots already deeded to the Trustees rate as follows, viz:

Lot No.	105	$300
"	106	300
"	139	300
"	174	300
"	206	250
"	207	250
"	208—half lot	150
		$1850

Your Committee would further state that, in setting the fence on the west side, fourteen feet of said grounds were left out, so as to make the street on the west (Wright street) eighty feet in width, and would suggest that the same width—eighty feet—be continued south, along the 40 acres, on the west line, making an avenue through to the 160 acres known as the experimental farm, and that said avenue be called "College Avenue."

Time having been given to the Committee to report upon the purchase of the lots upon the east side of the University grounds, the Committee now report as follows:

Twenty-four lots upon the east side of the University grounds, in blocks 41, 42, 51 and 54, making half of said blocks, and consisting of three tiers of lots, running from Main street, on the north of the University, to the Springfield road south. The cost of said twenty-four lots on the east would be, at present prices, as follows:

Lot	5	Block	41	$300
"	6	"	41	450
"	5 & 6	"	42	900
"	5 & 6	"	51	900
"	5	"	54	300
"	6	"	54	300
"	3	"	41	300
"	4	"	41	300
"	7 & 8	"	41	900
"	3 & 8	"	42	600
"	4 & 7	"	42	900

Lot	3	Block	51	$300
"	4, 7, 8	"	51	1,350
"	3	"	54	450
"	4 & 8	"	54	600
"	7	"	54	300
Twenty-four lots				$9,150

By the vacation of the streets, four more lots would fall to the Trustees, which would make the whole number of the lots, in fact, twenty-eight; twenty-four of which would have to be paid for, and four gained by the vacation of the streets passing between certain lots in the twenty-four.

The purchase of these lots would add over five and a half acres to the grounds, making in all about twenty acres, which will prove in the end to be none too much.

In the purchase of the above lots, the ground would be extended on the east and west, so as to bring the University grounds proper to the same width as the forty acre tract known as the Wills tract; thus amplifying the college grounds for ornamental shrubbery, flower gardens, parade grounds, etc., and bring it into uniform width with the farming lands, adding beauty and symmetry to the whole premises. A consideration of these facts induces your Committee to most respectfully recommend the purchase of the last-mentioned twenty-four lots.

(Signed) J. W. SCROGGS,
M. L. DUNLAP,
J. H. PICKRELL.

By vote of the Board, this report was laid upon the table.

The Treasurer of the Board, J. W. Bunn, read, by request, a statement of his receipts, expenditures and investments to this date.

Mr. Cobb, from Finance Committee, read a proposition from Mr. Lewis, for the purchase of one hundred thousand acres of scrip at eighty-five cents per acre.

The proposition was referred to the Finance Committee.

On motion, the Board took a recess until 2 o'clock, P. M.

AFTERNOON SESSION.

November 26, 1867.

Board met at 2 o'clock.

Regent in the Chair.

Twenty-two members were present.

The Chairman called for the report of Committee on Library and Cabinet.

Mr. Burroughs, Chairman, reported in a fragmentary manner, asking time to arrange and file his report.

On motion, his request was granted, with instructions to lay his report, when arranged, upon the table, to be taken up in its regular order.

On motion of Mr. Johnson, Mr. John P. Reynolds, Secretary of the Illinois State Agricultural Society, who was present, was invited to participate in the deliberations of the Board.

Mr. Quick presented the following resolution, which was laid upon the table, to be taken up in connection with the report of the Committee on Library and Cabinets, viz:

Resolved, That the Committee on Library and Cabinets be authorized, in their discretion, to purchase the Cabinet of Professor Bromley, as soon as there are sufficient funds in the treasury, on the best possible terms, not to exceed in amount the sum of six thousand dollars.

REPORT OF COMMITTEE ON HORTICULTURAL DEPARTMENT.

Samuel Edwards, from Committee on Horticultural Department, made a minority report, which was laid upon the table, to be considered in its proper order, viz:

The undersigned, members of the Committee on Horticulture, would respectfully represent to this Board, that having had no previous notice that a report would be expected from us at this meeting, and also, the majority of the members of our committee being absent, we are unable to make a full or even a majority report. Yet we would recommend to the Board that a suitable person or persons be employed by the Agricultural and Horticultural Committees, to survey and lay out the one hundred and sixty acre farm, as well as the lands surrounding the Institute building, with the intervening lands, employing an experienced landscape gardener, if they deem expedient, to assist in said survey, causing accurate maps of the same to be made, and that the said person or persons shall take measures to secure the preparation of ground and planting of screens, the coming spring, upon the west and north sides of the experimental farm and the Busey farm. Also, as liberally as may be practicable, for the purpose of shelter, on grounds surrounding the University building, without injuring the general appearance of said grounds.

We would also further recommend that, in said survey, provision be made for planting an arboretum of all ornamental and forest trees, likely to succeed, fruit trees of various kinds adapted to cultivation here, and for shrubbery, kitchen and flower garden.

[Signed] SAMUEL EDWARDS,
O. B. GALUSHA.

[Charles H. Topping arrived a little later, read and signed the above report, thus making it a *majority* report.—*Rec. Sec.*]

Mr. Goltra presented a proposition which had been handed him,

relative to hedging a portion of the lands located by the Board; which, on motion of Mr. BRAYMAN, was indefinitely postponed.

REPORTS CONSIDERED.

Mr. FLAGG moved that the reports of the several committees, which had been laid upon the table, be taken up in their regular order for action.

Carried.

I. REPORT OF EXECUTIVE COMMITTEE.

The report of the Executive Committee was called up, when Mr. A. M. BROWN moved its approval, but temporarily withdrew his motion.

Mr. BURROUGHS offered an amendment to the resolution creating an Executive Committee of this Board.

On motion of Mr. MAHAN, the resolution of Mr. BURROUGHS was referred to Committee on By-Laws.

Mr. BROWN's motion for approval was then renewed.

Mr. BURCHARD moved the postponement of the consideration of this motion, until the meeting of the Board to-morrow morning; which was agreed to.

II. REPORT UPON ACQUISITION OF ADDITIONAL LOTS.

Mr. A. M. BROWN moved that we now take up the report of the committee appointed by the Executive Committee, for the consideration of the purchase of lots adjoining the University building and grounds.

The motion prevailed, and Mr SCROGGS read said report. [See page 70.]

Mr. A. M. BROWN offered the following resolution:

Resolved, That the Executive Committee be authorized and directed to purchase the lots specified in the report just read, provided the money necessary to make the purchase can be raised by sale of a sufficient portion of the Griggs farm.

Mr. JOHNSON moved to refer the report, and resolution of Mr. BROWN, to the Finance Committee, with instructions to report to-morrow morning, at 10 o'clock.

Which was lost.

The resolution of Mr. BROWN was then put to vote, and lost.

Mr. Lawrence moved that the report read by Mr. Scroggs be referred to the Finance Committee, with instructions to report to the Board, at its next annual meeting.

Carried.

III. REPORT OF FINANCE COMMITTEE.

Mr. Burchard called up the report of Finance Committee, and moved its adoption.

Carried.

Mr. A. M. Brown moved that the Finance Committee be instructed to report, at its earliest convenience, the amount of Champaign county bonds it will be necessary to sell, to furnish funds for the immediate use of the Board.

Carried.

IV. REPORT OF COMMITTEE ON AGRICULTURAL DEPARTMENT.

Mr. Flagg moved to take up the report of the Committee on Agriculture; which was so voted, and the Secretary read the report. [See page 68.]

Mr. Dunlap moved to strike out the words "Regent and Professor of Agriculture," as superintending and directing the work of the "head farmer," and insert the words "Executive Committee" in their stead.

Mr. A. M. Brown presented the following as a substitute for article 7, which Mr. Dunlap proposed to amend, viz:

Resolved, That ——— be appointed Superintendent of the farm of the University, and that he have the control and management of the said farm; that he shall, in March of each year, make a report to the Regent, indicating his plans for the coming season, with an estimate of the cost of labor, implements, seeds, working and other animals, required by him; and this report shall be submitted to the Executive Committee, for their approval or rejection, and for the appropriation of the necessary funds. And the said Superintendent shall, also, in ——— of each year, make a report to the Regent of the result of his plans of the previous season.

The substitute of Mr. Brown, and the amendment of Mr. Dunlap, were lost.

Article 7 of the report was adopted.

Article 8 of the report was, upon motion, referred to the Committee on Agriculture, with instructions to report to-morrow morning.

Mr. PICKRELL asked to be excused from further attendance at this meeting; which was granted, by vote.

On motion of Mr. MAHAN, the Board adjourned (at 5:30), to meet at this place at 7 o'clock, this evening.

EVENING SESSION.

November 26th, 1867.

The Board assembled, and was called to order, by the Regent, at 7 o'clock.

The REGENT, having called Gen. BRAYMAN to the Chair, moved that the report of Committee on Library and Cabinet be taken up.

It was so voted by the Board. (Mr. BURROUGHS having, agreeably to vote of the Board, arranged and filed his report, upon which Mr. QUICK's resolution for the purchase of cabinet was based.)

V. REPORT OF COMMITTEE ON LIBRARY AND CABINET.

The Committee on Library and Cabinet respectfully report:

That no funds having been placed at their disposal, and no authority having been given them to make any purchases, their labors have been confined to inquiries what were likely to be the immediate and most pressing needs of the University, in respect to books and means of illustrating the different departments of Natural History, on the opening of the courses of instruction in the spring, and how these wants can be best met.

Having in view a proportionate distribution of the present financial resources of the University between the different departments, according to the experience of similar institutions, the Committee believe that, from the present means, at least ten thousand dollars to library, and ten thousand to cabinet, would be only a fair proportion.

It is not, however, supposed that it would be possible for the Board to appropriate this whole amount for immediate expenditure; and the Committee therefore ask that ($1,000) one thousand dollars be placed at their disposal, to be expended during the next winter, at the best advantage possible, in purchasing such books as are indispensable on the opening of the University in the spring.

In respect to cabinet, the Committee have pleasure in calling the attention of the Board to an opportunity which they believe to be of unusual interest. A collection in the three different departments of Mineralogy, Geology and Conchology, which was made by Prof. Bromby, of Georgia, during the last twenty-five years, is offered to this University on terms which we believe extremely favorable.

The catalogues of this collection, with estimates of its value, from Prof. C. U. Shepherd and other leading scientific authorities, are present; and presenting these

to the Board for their full information, the Committee recommend the purchase of the collection, as the best means ever likely to be offered for the supply of this importa d partment.

All of which is respectfully submitted.

[Signed]

J. C. BURROUGHS,
A. M. BROWN,
NEWTON BATEMAN,
I. S. MAHAN,
W. C. FLAGG.

Mr. QUICK's resolution of appropriation for library and cabinet was read [see page 72]; when

Mr. DUNLAP moved to postpone indefinitely its consideration.

This motion was put and lost.

The resolution was adopted.

Mr. MAHAN, Chairman of Committee on By-Laws, reported a code of by-laws for the government of the Board.

Mr. DUNLAP moved that the by-laws be read and acted upon *seriatim.*

Which was so ordered by the Board.

The code of laws was read and adopted, as follows:

BY-LAWS.

I. MEETINGS OF THE BOARD.

SECTION 1. All meetings of the Board of Trustees shall be held at the University building, in Champaign county, and a majority of all the Board shall constitute a quorum.

SEC. 2. The annual meeting shall be held on the —— Tuesday in March.

SEC. 3. Special meetings may be called, whenever necessary, by the Regent, Corresponding Secretary or any five members of the Board, by mailing to each member of the Board, or personally serving a copy of such call, at least ten days before the day of meeting, provided, that in such notice the business to be attended to at such meeting shall be specified.

II. ORDER OF BUSINESS.

SECTION 1. The order of Business, at each meeting of the Board, shall be:

1. Reading of the Scripture, and prayer.
2. Calling the roll of members.
3. Reading, correction and approval of minutes of last meeting.
4. Reports of the Executive Committee of all business transacted since the last meeting of the Board.
5. Reception and consideration of communications.
6. Reports of officers.
7. Reports of standing committees.
8. Reports of special committees.
9. Unfinished and new business.

III. RULES OF DEBATE.

SECTION 1. In discussions, and the disposition of business, the Board shall be governed by the parliamentary rules and usages usually governing deliberative bodies.

SEC. 2. Every resolution offered shall be reduced to writing, and sent to the Secretary's table.

SEC. 3. No member shall speak more than ten minutes, or more than twice, upon any proposition, without the consent of the Board.

IV. OFFICERS AND APPOINTEES OF THE BOARD.

The officers of the Board shall consist of the Regent, Treasurer, Corresponding Secretary, and Recording Secretary; and the Board may, from time to time, appoint such professors, tutors or instructors, and such subordinate officers and employees, as they may deem necessary to carry on the Institution.

V. TERMS OF OFFICE.

SECTION 1. The Regent and Treasurer shall be elected at each biennial meeting, and hold their offices for two years, and until their successors are elected and qualified.

SEC. 2. The Corresponding and Recording Secretaries shall be elected at the annual meeting, and hold their offices for one year, and until their successors are elected and qualified.

SEC. 3. Professors, and other officers and employees, shall be appointed at such time, in such manner, and for such term, as the Board shall, by resolution, in each case, direct, and be subject to removal at the pleasure of the Board.

VI. DUTIES OF REGENT.

SECTION 1. The Regent shall be the President of the Board of Trustees, and of all the several faculties of the University; may vote on all questions or propositions submitted to the Board, and, upon calling any member to the chair, may participate in debate.

SEC. 2. He shall be the chief executive officer of the Board, and shall see that the orders and resolutions of the Board are carried into effect, when the Board shall not otherwise direct; and shall take care that the by-laws and regulations relating to the duties of subordinate officers, instructors, and students, are faithfully observed.

SEC. 3. He shall be the Chairman of the Executive Committee, and, as such, shall report at each meeting of the Board the doings of the committee since the last session of the Board.

SEC. 4. He shall also, as Regent, make an annual report to the Board, exhibiting the progress and condition of the several departments of the University, with such suggestions as he may deem needful for their improvement.

VII. TREASURER.

The Treasurer shall give bond, with approved security, in the sum of three hundred thousand dollars. He shall be the custodian of all moneys and securities belonging to the University, except such as are, by law, placed in the custody of the State, and of the land scrip, until the same shall be sold or located. He shall invest the funds of the University, as directed by the Board, and he shall pay no money out of the treasury, *except upon a warrant* of the Regent, countersigned by

the Recording Secretary. He shall, also, annually, and oftener, when required, make a detailed report to the Board of all receipts and disbursements, since making his last report.

VIII. CORRESPONDING SECRETARY.

The Corresponding Secretary shall perform the duties indicated and required by the act creating his office. He shall hold his office in the University building as soon as the institution is opened.

IX. RECORDING SECRETARY.

SECTION 1. The Recording Secretary shall perform the duties required of him by law, and usually appertaining to his office. He shall keep the books and papers belonging to his office at the University building, at Champaign, and the same shall be open to the inspection of any member of the Board, or officer of the University. He shall be the clerk of the Executive Committee, and, as soon as the University is open, reside at or near thereto.

SEC. 2. He shall countersign all warrants on the Treasurer, and note on each the date of the order of the Board or Executive Committee authorizing the issuing of the same.

X. SALARIES.

The salary of each officer, professor, instructor and other employee of the University shall be fixed by resolution at the time the appointment is made, subject to alteration in the discretion of the board; and a warrant shall be drawn for the same according to law, on the Treasurer, as the same shall fall due, provided there are funds in the treasury to pay the same.

Salaries shall be payable quarterly, on the first days of April, July, October and January, of each year.

XI. DISABILITIES OF MEMBERS.

No Trustee, except as provided in the charter, shall receive any salary or compensation (except actual expenses) for services as an officer, or while acting under any appointment of the Board: nor shall any Trustee be interested in any contract made with, or on behalf of, the Board: *Provided*, that this section shall not apply to any of the present officers or appointees of the Board.

XII. STANDING COMMITTEES.

At the annual meeting, the following Standing Committees shall be appointed:

1. An Executive Committee, consisting of the Regent and eight members.
2. An Auditing Committee, of five members.
3. A Finance Committee, of five members.
4. Committee on Faculty and Study, of Regent and five members.
5. Committee on Agricultural Department, of five members.
6. Committee on Horticultural Department, of five members.
7. Committee on Military Department, of five members.
8. Committee on Mechanical Department, of five members.
9. Committee on Buildings and Grounds, of Regent and five members.
10. Committee on Library and Cabinets, of five members.
11. Committee on By-Laws and Rules, of three members and the Regent.

XIII. DUTIES OF THE EXECUTIVE COMMITTEE.

SECTION 1. The Executive Committee shall meet, at the seat of the College, at *least quarterly,* and oftener if they shall find it necessary, for the transaction of any *business necessary to be* done in the vacation of the Board.

SEC. 2. The Executive Committee shall, for the purposes for which they were appointed, possess all the powers of the Board: *Provided*, That they shall not revise or change the acts of the Board, nor act upon any matters referred to any committee of the Board, that may be entrusted with any special business; shall not purchase or sell real estate, nor the land scrip nor bonds belonging to the University, without the consent, in writing, of a majority of all the members of the Board, and shall be strictly confined to such business as cannot be left till the annual meetings of the Board.

SEC. 3. The Committee shall hold their office till the annual meeting next after their appointment; and they shall submit the minutes of their proceedings, or make a report, through their Chairman, to every meeting of the Board, of all their transactions since the last meeting of the Board.

SEC. 4. Special meetings of the Executive Committee may be called in the same manner as special meetings of the Board.

XIV. AUDITING COMMITTEE.

The Auditing Committee shall examine and report upon all accounts of the Regent and the Treasurer, and audit all accounts referred to them by the Board or Executive Committee.

XV. THE FINANCE COMMITTEE.

The Finance Committee shall have the general supervision of the financial affairs of the University, subject to the rules and control of the Board. They shall make to the Board, at the annual meetings, a statement of the condition of the finances of the University, and an estimate of the income from all sources, and of its necessary and probable outlay for the succeeding year. And they shall report at all other meetings of the Board and of the Executive Committee, when required, and shall recommend such measures for the management of the revenues as they may think best.

XVI. COMMITTEE ON FACULTY AND COURSES OF STUDY.

The Committee on Faculty and Courses of Study shall recommend, from time to time, suitable persons for positions in the Faculty, in its various departments, and all necessary changes or modifications in the course of study.

XVII. DUTIES OF COMMITTEES ON DEPARTMENTS.

The Committees on Agricultural, Horticultural, Mechanical and Military Departments shall attend to the several subjects indicated by the titles of the committees. They shall recommend all measures necessary for the advancement of the interests of the various departments.

XVIII. COMMITTEE ON BUILDINGS AND GROUNDS.

The Committee on Buildings and Grounds shall consider and report upon all plans, estimates or proposals for the sale or exchange, repair or improvement of the buildings or grounds belonging to the University, or for the erection of buildings or fences on the same, and for their convenient division; and all orders of the Board for improvements on buildings and grounds (except the farms) shall be under the charge and control of the Committee.

XIX. COMMITTEE ON LIBRARY AND CABINETS.

The Committee on Library and Cabinets, of which the Regent shall be one, shall consider and report upon all matters relating to the care and arrangement of the

library and cabinets. They shall have charge of the purchase and exchange, under the direction of the Board, of all cabinet materials, books, pamphlets, periodicals or specimens. They shall report, from time to time, the condition of the library and cabinets, and their future wants.

XX. COMMITTEE ON RULES AND BY-LAWS.

The Committee on Rules and By-Laws shall prepare and recommend, from time to time, by-laws for the government of the Board in its business, and rules for the management of all the departments of the University.

XXI. AMENDMENTS OF BY-LAWS.

These by-laws may be repealed or amended, at any meeting of the Board, by a vote of two-thirds of all the members of the Board.

[Signed] I. S. MAHAN,
H. C. BURCHARD,
A. M. BROWN.

After the adoption of the by-laws, the Board adjourned to to-morrow morning at nine o'clock.

MORNING SESSION.

November 27, 1867.

The meeting was called to order by the Regent, at 9 o'clock.

Rev. Mr. LAWRENCE conducted the opening exercises.

The minutes of yesterday's proceedings were read by the Secretary, and approved by vote of the Board.

REPORT OF COMMITTEE ON MILITARY DEPARTMENT.

Gen. BRAYMAN, Chairman of the Committee on Military Department, presented the following report, viz:

The United States and the State of Illinois have, by appropriate laws, endowed and established an Industrial University, wherein shall be maintained, prominent in its course of studies, the instruction of a portion of the youth of the State in military science and practice.

Your committee recognize the wisdom and necessity of these enactments, as well as the duty of giving them full force. From the war of Independence to the present time, the successes and glories which crowned our arms have been due to natural courage, ready genius, and love of country, on the part of an intelligent and virtuous people, rather than to their knowledge of the art and practice of war.

The Military Academy at West Point, founded in the early days of the Republic, has furnished graduates barely sufficient, in number, to officer our meagre regular establishment in times of peace. The universal dearth of military knowledge, and the want of competent leadership, remained unobserved during the long period of repose which our country happily enjoyed. But when, only a few years since, the whole nation was, almost

in a day, plunged into the midst of a terrible war—when treason had infected our little army, and seduced from honor and allegiance, many, even, whose power to make crime formidable, was the gift of the beneficent government they would destroy, the value of thoroughly trained leadership became apparent. The true men whom the nation had educated in her great military school, stood out in grand relief, and though few in number, became conspicuous in organizing and training our armies and leading them to victory.

But of the hundreds of thousands who came from the peaceful walks of life to the camp and field, in response to the call of patriotism, there were not enough educated military men to furnish one to each regiment. Thousands were commissioned and sent to the field, who had never before worn a sword, nor even learned enough of tactics to instruct a squad in the simplest exercises. Ignorance of all that related to military life and duties was profound and almost universal. But the rebound was prodigious. Officers and men, as if by intuition, learned the most difficult and complicated duties in the very act of performing them. Our citizens became soldiers—our awkward recruits became veterans—our volunteer armies saved the country—our volunteer officers performed their parts in the terrible drama, with such courage, skill and success, that future ages will believe that the science and practice of war had been the only study of their lives.

But the picture has a darker shade. The present generation cannot comprehend, and history will never tell, how many terrible disasters befell the armies of the Union—how many gallant men have died—how many live, broken and mutilated—what millions of treasure have been wasted—how often the flag went down in dishonor, while the nation was learning the rudiments of war. We now confess, that though rare natural gifts and persistence may achieve much, each occasional success is overshadowed by many failures A schoolmaster, whose rod of correction we yet feel, has taught us that he who would perform a duty well, must first learn how to do it—that true greatness consists in reaching the highest results at the least expense of time, labor, life and material. We do not officer and man our ships with land lubbers, and send them out into ocean storms, to take their first lessons in navigation. Neither do we propose to await, in willful ignorance, the shock of future wars, to learn how wars should be met, and conducted, and prevented, too; for the experience of all nations proves, that preparation for war is often the surest pledge of peace.

We justly claim that our republican form of government has its basis upon the intelligent consent and patriotic support of an educated people, thus enabling us to dispense with standing armies. A wise body of constitutional and statute law, universal education and suffrage, toleration in religion, and a free press, secure us against the disorders and calamities felt by nations wanting those blessings.

That people, however, cannot be said to be well educated who remain untaught in a department of knowledge, on which, despite all that casuists and moralists may say, the peace and security of society, nay, the existence of nations, must ultimately depend.

Nothing will supply this demand but a uniform system of military education, having its origin in governmental authority and support, and sustained by the several states, in such manner as to diffuse military knowledge, and foster a martial spirit, throughout the great body of the people. The Military Academy at West Point, as now organized, cannot, after supplying the scientific corps, furnish each regiment of the regular army with one officer every two years. No possible enlargement of that institution—no increase in the number of like establishments, can supply the growing wants of the country. Neither will institutions founded for the sole purpose of furnishing officers for the army, predestined to a military life, suffice. It is desired to send into all communities, and all employments, men of sufficient military training, engrafted upon the common stock of knowledge, to fit them for transfer to the camp and the field, as instructors and leaders, whenever the exigencies of war may demand their services.

Recent events have shown that the stability of our government and the honor of our flag are safe in the popular support. The great need now is positive uniformity, to be found only in the recognition of a national *standard of military* education, maintained by

the government, and diffused throughout the nation, so that citizens of all the states and graduates from all the schools may fall into line, and prove it true that "in union there is strength."

The donation of lands made by Congress was in furtherance of this general design. Attention is now called to a plan, set on foot under orders from the War Department, and about to be submitted for the action of Congress, so grandly national in design, so comprehensive in scope, so minute in detail, as to invite at once the approval and the co-operation of this institution in carrying it into effect.

Under special orders of the War Department, No. 167, issued April 4, 1867, Major J. H. Whittlesey, of the United States army, (retired from active service,) an officer of great merit and ability, was detailed to proceed to West Point, New York, and to such of the principal colleges of the United States, as will enable him, after consultation with the college authorities, to report a method of introducing a suitable system of military instruction into such of the colleges of the United States as shall desire it.

In a personal interview with the Acting Secretary of War, in October, the chairman of your committee found that officer deeply interested in the subject of popular military education, and was, by him, referred to Major Whittlesey, for consultation. Correspondence with him has brought to the hands of the committee full reports and explanations, accompanied by a draft of a bill to be submitted by Gen. Grant for the action of Congress.

Under such auspices, and urged by a public sentiment so fully instructed by recent events, it cannot be doubted that the National Legislature, at its approaching session, will adopt this plan substantially as presented, as the basis of an enlarged and truly national military establishment.

The Illinois Industrial University, having been created and designated by the Legislature for the purpose of applying the land grant to a course of education, of which military science and practice shall form a part, comes within the provisions of the bill. It is proposed—

1. To establish a bureau of the War Department, in charge of a director-general of military education, whose duty shall be to inspect and supervise military academies, secure uniformity of instruction, and enforce faithful compliance with the laws and regulations on those subjects.

2. That when any institution designated shall have capacity sufficient to educate, at one time, one hundred male students in a complete course of liberal studies, with grounds for military exercises, there shall be detailed a competent officer of the army, to act as military professor, with an assistant; the military professor to supervise the prescribed course of military studies and exercises to be taught, and enforce general regulations for the government of the officers so detailed, but without infringement of the rights of self government of the institution.

3. That each college which shall have established a course of instruction in military studies and exercises, in conformity to the act, shall receive the necessary text books, ordnance and ordnance stores, and camp and garrison equipage, with a detail of one ordnance sergeant and two musicians, at the expense of the United States.

4. That the Faculty of Arts of such college may, each year, recommend to the President of the United States a list of one-tenth of the graduates distinguished for general proficiency in the collegiate course, special attainments in military science, and skill in military exercises, of good moral character, and sound health, whose names shall be published in the army register, and of whom one from each college shall be commissioned in the army, as in the case of graduates from West Point.

5. That each college thus comprising military studies and exercises in its course of instruction, shall receive from the U. S. treasury two thousand dollars, to be expended under the charge of the Director of Military Education in the purchase of the necessary books of reference, maps, models and text books; also, ten thousand dollars, to be expended in constructing a suitable building for the purpose of an armory, and for use as a drill hall, in inclement weather.

The foregoing brief outline indicates, with sufficient clearness, the general plan. The government assumes the necessary expenses, and provides all the means of efficient military instruction, so as to make it an absolute gratuity to students. Your Committee suggest the same general plan of military education, whether the bill proposed by the War Department be adopted by Congress, or whether the University is left to carry existing laws into effect with its present means.

The course of military studies should comprise the theory of ordnance and gunnery, military engineering, including the attack and defense of works; the art of war, illustrated from military history; military law, with the practice of courts martial; and the theory of military discipline, police, and administration. The method of illustration will be by recitation and lecture, with suitable text books for study and reference, corresponding, in all chief features, to the theoretical course of military science at West Point, during the last year of study—modifying and reducing the full course, when expedient, so far as consistent with the mastery of the fundamental principles of military science; thus accomplishing all that the limited time will allow in obtaining sound general views, and an ample foundation for future study and improvement. This course will require a recitation or lecture of one hour daily, on four or five days of the week.

The equipment of the lecture room will not be costly. The maps and drawings can be easily purchased or copied, and will serve all the essential purposes of instruction. It will be desirable to collect, as opportunity offers, models of the most important instruments, engines and appliances of war, to include matters of ordnance, fortifications, devices for attack and defense, mines, bridges, etc. They will greatly aid the lecturer in imparting instruction, and the student in obtaining clear views on these subjects; and will be more necessary in consequence of the modification of this course to a university standard.

The course of military exercises would comprise practical instruction in infantry tactics, through the school of the soldier, company and battalion, with skirmishing, the forms of parade, and the duties of guards, and, when practicable and desired, in fencing, and the sabre and bayonet exercise.

The attainment of a uniform course of study and exercise throughout all military schools, being a leading object, the general plan pursued at West Point should be followed, as nearly as practicable. As the military professor will, of necessity, be a graduate of that institution, and our text books and methods of instruction the same as there employed, this object will be accomplished, as a matter of course. The corps of students will be organized into companies of moderate size, from fifty to sixty strong, so as to give an even number of companies for the University battalion. This will be the habitual organization for infantry drills and general parades. The battalion staff, and the company officers, will be taken from the senior class; the staff sergeants, and the company sergeants, from the junior class; the corporals, from the sophomores; with such modifications as may suit the case of students on shorter or longer courses. All these grades should be taken by detail for limited periods, so as to give to all, as far as practicable, the advantage of practice in all positions. Students, not on duty as officers, and all the freshman class, will do duty as privates, the classes being intermixed in companies in definite proportions. Details for duty as officers should be based, not only on proficiency in this particular department, but have reference to superior excellence in all others, and to general deportment. For this and other reasons, the details, if made by the military professor, should be approved by the University faculty, or by the Regent, as might be expedient. Whenever possible, in the course of practical instruction, expert members of the superior classes should be employed in drilling the lower, as well from the necessity for such assistance, as for the benefits to students so employed. In this way, military habits and routine will be transmitted from class to class, with each succeeding year.

The studies and recitations of classes will proceed, uninterrupted by changing seasons; but exercise and drill will require the drill room during inclement weather. This will insure steady progress in military practice, and also afford to all students a due d-

of physical exercise. The experience of other institutions shows that, in thus cultivating a martial spirit among our young men, and affording proper means for its development, we supply, in a great degree, the place of the gymnasium, and withdraw students from a class of amusements scarcely beneficial, sometimes injurious. The drill room will serve for an armory for the deposit of arms and accoutrements, when not in use.

The necessity for field music, the drum, fife and bugle, is obvious. It is indispensable to discipline, and will lend a cheerful and inspiring influence to the routine of college life. Whether furnished by the government, under the proposed bill, or provided by employment in the usual way, a volunteer band, composed of students, could soon be organized, fully competent to the service.

It is recommended that there be adopted a uniform, to be worn by students, a style or fashion of dress which will be genteel, comfortable and economical for all occasions, of suitable material—that for summer use being of a lighter texture. A University button, with appropriate devices, should be manufactured expressly for the purpose. Economy would dictate that the uniform be the habitual costume of students, since it would save the expense incident to variety and change of fashion. It would secure personal neatness, and place all students upon a footing of republican equality—the sons of the rich and the poor meeting upon a common level, with nothing in their apparel to stimulate the pride of the one, or wound the self-respect of the other. The experience of all institutions which have adopted the uniform shows that the distinction which is thus conferred awakens an honorable ambition to excel, refines the manners, gives a manly tone to the character, and, in some sort, makes each individual student feel that the reputation of his class and the honor of the institution are in his keeping.

It is recommended that the course of military study, in classes, etc., and the required drill, field exercises and parades, be established by University authority, and enforced by the usual marks of merit and demerit, which shall stand to the credit or discredit of the student, and be taken into consideration, as in other departments, in fixing his grade as a scholar, on examinations for advancement and graduation.

The term and extent of theoretical studies should be subject to modification and abatement, at the pleasure of the Faculty, in deference to the time which students expect to remain in the institution and to their chosen occupations in life. The daily martial exercises should, however, be rigidly enforced, except when remitted by the Regent, by reason of conscientious scruples or physical debility. The reason for this is found not only in the necessity for uniformity in hours of practice and the value of the discipline which military drill imparts, but that every student may, at proper intervals, be drawn from his dormitory and his overwork of brain, and put through a course of physical effort, healthful and invigorating, which will rescue him from the rust of inaction, and secure the "erect carriage, the firm, graceful, manly bearing, the expansion of chest, the harmonious action of every limb and muscle; in fine, that perfect physical development, without which mental vigor, in its highest type, can never be long maintained." The race of wretched dyspeptics, consumptives and hypochondriacs, which crowd the learned professions and go trembling to their graves before the work of their lives is half done, are eloquent witnesses against that system in which the education of the mind is sought in violation of the laws of health. It is time that this glaring defect in academic education is remedied. Athletic and gymnastic sports have, in many institutions, been resorted to with success. By substituting military exercises, we accomplish the same end, aid college government, and furnish the militia of our State with men of their own households, able to make soldiers of them when the country calls them to rally round the flag.

It may be already inferred, that it is intended to place the institution so far upon a military footing, as to bring all the students under the care of the professor of the military department, whose duties and authority shall be that of military commandant—this authority not to include the time devoted to classes, nor to come in collision with other departments of study. Its recognized subordination to the authority of the Regent, and its subjection to proper rules, will make the workings of this department easy. The usual regulations of the camp, as to exercise, recreation and sleep, the reveille, the

roll call, the call to and from duty, the tatoo—all in their regular order, can come into place, without disturbing, but rather aiding and directing the observance of college duties and discipline.

It is due to the dignity of this institution, and to the expectations of the people, that in this, as in all other departments, we fix a high standard in the outset, and work up to it as we can. The committee would include in the general plan, artillery and cavalry, as well as infantry study and drill; but have, for the present, purposely omitted the two first named, until success in the last, and sufficent resources, shall justify attention to them.

Your committee, cordially approving the plan prepared by Major Whittlesey, recommend that a proper expression be made by the Board of Trustees, and our Senators and Representatives in Congress requested to aid in its passage into a law, and that we stand prepared to avail ourselves of its benefits, by entering upon the organization of the militry department, according to its provisions.

It is deemed good policy, however, to put the students in uniform, and inaugurate a system of military government, instruction and drill, on opening the University in March, or at all events at the fall term of 1868.

The office of Military Professor can be temporarily filled by the incumbent of another chair, and, if necessary, a competent drill officer employed to organize the first company and commence with the usual simple exercises. Brigadier General Haynie, Adjutant General of Illinois, has given encouragement that the necessary arms and accoutrements may be obtained from the State Arsenal. Indeed, we can, by organizing as volunteer companies under State laws, become entitled to arms, as well as to the commissioning of officers.

In this way a beginning can be made, almost without cost to the Institution, and we can go forward in compliance with the law, prepared to adopt the great national plan, when enacted, or to proceed independently under existing laws. It is proper to say here, that in either case, the military department will fall quietly into place with other branches in no wise interfering with them; it being particularly provided in the Congressional bill referred to, and in the lucid explanation of Major Whittlesey, that officers detailed by the War Department shall act in subordination to the Regent and observe the regulations established for the government of the University, not departing, of course, from the plans prescribed by Congress. It is designed, and eminently desirable, that the connection be perpetual; but the officers and aid of the government will be withdrawn whenever the authorities of the University so determine.

In preparing this report, resort has been freely had to the text of the very able communication, made to the Secretary of War, by Major Whittlesey, who with great courtesy, promptly supplied the committee with valuable information on all the points here presented.

To give effect to the foregoing views, the following resolutions are respectfully reported for the consideration of the Board.

Respectfully submitted,

M. BRAYMAN, *Chairman.*
THOMAS QUICK,
LUTHER LAWRENCE,
LEMUEL ALLEN,
Committee.

November 26, 1867.

RESOLUTIONS.

1. *Resolved*, That in compliance with the laws on that subject, the military department of this University shall be established as part of the regular and necessary means of education.

2. *Resolved*, That there shall be appointed, as soon as the same shall be needful and proper, a Professor of Military Tactics and Engineering, and such assistants as shall be necessary in his department.

3. *Resolved*, That all students shall be taught in the branches appropriate to this department, to such extent, and with such modifications and exceptions, as shall be provided in the code in force for the regulation of studies.

4. *Resolved*, That in order to secure neatness and economy, and to distinguish the students of this University, a uniform shall be prescribed and worn, of material known as cadet gray, appropriately made, and furnished with a University button, having apt devices, and a University cap, in such form as shall be prescribed.

5. *Resolved*, That the Military Professor, or the officer or person having, for the time being, charge of the military department, shall have the authority and perform the duties of military commandant, and shall, under authority of the Regent and Faculty, enforce such rules and orders as are usual at West Point and other military schools, comprising the regulation of hours, personal deportment and intercourse, and in such manner as shall insure order, obedience and discipline, and promote the general objects contemplated; and that suitable music, consisting at least of the drum and fife, be provided. These duties to be so arranged in rules and regulations as to comprehend the entire police and administration of the University, and subject to such control and supervision as will promote harmony and efficiency.

6. *Resolved*, That the Regent, the Chairman of the Military Committee, and the Treasurer, be instructed to procure from the proper authorities of this State such arms and accoutrements as shall be necessary for use of students in drill, and such books of tactics as may be required to begin instruction in military exercises.

7. *Resolved*, That these regulations be put in force as far as feasible on the opening of the institution in March next; but that the University uniform may not be required to be worn by students until the fall term, when it shall be worn by all.

8. *Resolved*, That this Board cordially approve, and respectfully recommend to the favorable action of Congress, at its coming session, the bill and general plan reported to the War Department by Major J. H. Whittlesey, U. S. A., for providing a system of National Military Education in colleges, and earnestly request the Senators and Representatives from this State, to support the same.

9. *Resolved*, That this University will hold itself in readiness to adopt fully the proposed national plan, and make the same a part of the permanent system of instruction in this institution, as the best means of securing to the people the benefit of military education, and for establishing upon an enduring foundation the cherished institutions of our State and common country.

Mr. Dunlap moved to accept the report.

Which motion was approved.

Mr. Dunlap moved the adoption of the resolutions contained in the report.

Mr. Galusha moved to amend the resolution requiring "all students" to wear a uniform dress, by inserting the word "male;" so that it shall read "male students."

The ayes and noes were called for on the proposed amendment, and taken, as follows:

Members voting Aye, were Messrs. Cunningham, Dunlap, Edwards, Galusha, Harding, McMurray—6 votes.

Members voting No, were Messrs. Allen, Bateman, Blackburn, Brayman, A. M. Brown, Burchard, Burroughs, Cobb, Flagg, Goltra, Hayes, Johnson, Lawrence, Mahan, McConnell, Quick, Scroggs, Topping and the Regent—19 votes.

The amendment was declared lost.

The resolutions were adopted, and the report

Ordered, by vote of the Board, to be recorded and published with the minutes.

VACANCY IN COMMITTEE ON BUILDINGS AND GROUNDS FILLED.

Mr. McConnell was appointed to fill the vacancy in the Committee on Buildings and Grounds.

Which appointment was confirmed by the Board.

REPORT OF COMMITTEE ON FACULTY AND COURSE OF STUDY.

The Regent called Mr. Burchard to the Chair, and presented a report as Chairman of the Committee on Faculty and Course of Study.

The Committee on Courses of Study and Faculty, respectfully submit the following report:

Without pausing to detail the several reasons for their conclusions, they offer the following distinct recommendations:

I. SPRING TERM.

They recommend that the Spring Term shall open on the 2d day of March, and close on the 13th day of June, giving a term of fifteen weeks.

II. THE COLLEGE YEAR.

They recommend that the College Year shall, hereafter, begin with the opening of the Autumn Term, and shall embrace thirty-six full weeks, divided into three terms, of twelve weeks each.

III. CALENDAR FOR 1868–9.

The Autumn Term shall commence September 14th, and close December 5th.

The Winter Term shall commence December 7th, and close March 6th, 1869.

The Spring Term shall commence March 15th, and close June 6th.

A recess shall be taken, embracing the holidays.

A vacation of one week shall occur between the Winter and Spring Terms.

IV. AGRICULTURAL AND HORTICULTURAL COURSES.

The committee present the accompanying conspectus and course of studies in Agricultural and Horticultural science, and respectfully ask its adoption:

THE FARM.

- CHOICE OF FARM.
  - With reference to Markets.
  - With reference to Climate and its local modifications.
  - With reference to Soil and Subsoil and Slopes.
- ARRANGEMENT.
  - Sub-divisions into Fields, or Farms of different cultures.
  - Sites of Farm buildings.
- FARM STRUCTURES.
  - Fences.
    - Live; as Hedges.
    - Wood; Boards; Rails; Paling.
    - Stone; Wire.
  - Buildings. (RURAL ARCHITECTURE.)
    - Farm House; Dairy House.
    - Barns; Ricks; Cribs, etc., for grain, hay, etc.
    - Cellars; Fruit Houses, etc.
    - Cattle Barns; Stables, etc.
    - Pens; Styes, etc., for sheep and swine.
    - Hennery; Bee House, etc.
- FARM IMPLEMENTS.
- ROADS AND BRIDGES.
- SOILS.
  - Elements.
    - Mineral.
    - Vegetable.
    - Animal.
  - Classification.
    - Argillaceous or Clayey.
    - Silicious or Sandy.
    - Peaty.
  - Cultivation and Improvement.
    - By Chemical Agents.
      - Mineral manures.
      - Organic.—Animal; Vegetable.
      - Manurial green crops.
    - By Mechanical Agents.
      - Draining.
      - Subsoiling.
      - Plowing; Dragging; Rolling.
    - By Fallowing.
    - By Rotation of Crops.
- SUBSOILS.
  - Elements, Classification, Treatment.
- FERTILIZERS.
  - Chemical Composition.
  - Manufacture, Compost.
  - Preservation.
  - Modes of Application.

PLANT CULTURE.

- USEFUL
  - Grass Crops
    - Pastures
      - Pasture grasses.
    - Meadows
      - Cutting grass.
      - Curing.
      - Handling and Pressing.
  - Grain Crops
    - Corn
      - Varieties.
      - Planting and Cultivating.
      - Harvesting and Preserving.
    - Wheat; Rye. Barley; Oats. Buckwheat.
      - Varieties.
      - Sowing and Cultivation.
      - Harvesting, Threshing and Preserving
  - Root Crops
    - Potatoes.
    - Sweet Potatoes.
    - Turnips, Beets, Carrots, etc.
  - Textile or Fibrile Crops
    - Flax; Hemp; Cotton.
  - Cucurbitaceous Crops
    - Pumpkins; Melons, etc.
  - Trees
    - Forest and Fruit.
  - Broom Corn; Willow Bushes, Vines, etc.
  - (all of the above)
    - Structure, Physiology.
    - Chemical Composition.
    - Vegetable tissues.
    - Varieties.
    - Habits and Diseases.
    - Insects.
    - PRODUCTS.
      - Starch,
      - Sugar, etc.,
      - Flour, etc.,
      - Cider,
      - Wine, etc.,
      - Dyes, Acids,
      - Essences,
      - Medicines.
- WEEDS
  - Classes; Habits.
  - Uses; Products.
  - Modes of Extermination.
- PROPAGATION AND IMPROVEMENT
  - Seeding.
  - Hybridizing.
  - Transplanting.
  - Cuttings; Layering.
  - Pruning.
  - Inoculating; Grafting.

ANIMAL HUSBANDRY.

- DOMESTIC.........
  - Horses, Mules, etc.
  - Working Cattle.
  - Milch Cows.
  - Sheep, Swine.
  - Poultry, Bees.
    - Breeds and Varieties.
    - Structure and Physiology.
    - Animal Tissues, Chemistry.
    - Qualities; Speed; Strength; Fattening; Milking, etc.
    - Habits and Diseases.
    - Products.
- NOXIOUS.
  - Insects.
  - Reptiles.
  - Birds.
  - Mammals.
    - Classes.
    - Values.
    - Habits.
    - Extermination.
- STOCK RAISING.....
  - Breeding and its Principles.
  - Care of Young.
  - Feeding for fat, milk, work.
  - Training.
- VETERINARY SURGERY AND MEDICINE.
- RURAL LAWS, HISTORY, LITERATURE AND ECONOMY OF AGRICULTURE.

These studies will be arranged in a course occupying three years, as follows:

FIRST YEAR.

THE FARM.—Its measurements and mapping; subdivisions—meadows, pastures, orchards, wood lands, gardens, etc. Fences, hedges, farm buildings. Soils—classification and mechanical treatment of soils, plowing, etc. Drainage. PLANT CULTURE.—Structure and physiology of plants; classes of the useful plants, their characteristics, varieties, habits and values. Wheat culture, maize culture, grass culture, root culture, fruit culture begun, apples, pears, peaches, etc.

COLLATERAL STUDIES.—English language and composition, surveying, drawing, botany, French language and literature.

SECOND YEAR.

THE FARM.—Chemical elements and chemical treatment of soils. Fertilizers—their composition, manufacture, preservation and application. Climate, influence of light, heat and electricity on soils and vegetable growth. FARM IMPLEMENTS—principles of structure and use. Road making.

FRUIT CULTURE.—Modes of propagation, production of new varieties, diseases of fruit trees. Insects injurious to vegetation.

ANIMAL HUSBANDRY.—Breeds and varieties of neat cattle, horses, sheep and swine. Principles of breeding, rearing, training, fattening, etc. Chemical composition of food, and preparation of the several varieties. Sheep husbandry; poultry; bees.

COLLATERAL STUDIES.—Mechanics, chemistry, zoology, entomology, mineralogy, German language and literature.

THIRD YEAR.

AGRICULTURAL ECONOMY.—Relation of Agriculture to the other industries, and to commerce. The several branches of Agriculture. Agricultural book-keeping, the farm book, herd book, etc. RURAL LAW—of tenures and conveyances of land, of highways, of cattle, of fences, of noxious weeds, etc. Veterinary surgery and medicine. Landscape gardening, and laying out of large farming estates. Rural Architecture and Engineering, Foreign Agriculture, History and literature of Agriculture.

COLLATERAL STUDIES.—Geology, Meteorology, Physical Geography, Inductive Logic, Political Economy, History and Civil Polity, English Literature.

V. PREPARATIONS FOR ADMISSION TO THIS COURSE.

Candidates for the course in Agriculture and Horticulture, shall pass a thorough and satisfactory examination in penmanship, orthography, its practice and rules, reading and its principles, English grammar, geography, arithmetic, and history of the United States. It is also recommended that they be prepared in algebra, geometry, natural philosophy, and physiology; though these latter studies are not required.

VI. GENERAL EDUCATIONAL COURSE.

The committee also present the accompanying course of studies in science, literature, and art, and recommend its adoption. This is the general University or educational course, and it is so planned that while it affords a sound and liberal education, it provides for the students of the various industrial courses, the scientific knowledge they may need for a thorough mastery of those conrses. It will occupy four years, but a diligent student, of good ability, will often be able to master one of the industrial courses, while pursuing this. The studies of the course will be arranged as follows:

	REGULAR STUDIES.	OPTIONAL AND EXTRA.
	FIRST, OR FRESHMAN YEAR.	
1ST TERM—	Trigonometry and Surveying.	
	Structural Botany.	
	Cicero de Senectute.	
	French.	Greek.
2D TERM—	Analytical Geometry.	
	Systematic Botany.	
	Odes of Horace. French.	Greek.
3D TERM—	Systematic Botany,	
	Descriptive Geometry and	Greek.
	Geometrical Drawing.	
	Satires of Horace. French Literature.	
	SECOND, OR SOPHOMORE YEAR.	
1ST TERM—	Calculus.	
	Chemistry. Zoology.	Tacitus—Annals.
	German.	Greek.
2D TERM—	Chemistry.	
	Entomology, etc.	Tacitus.
	Physics—Mechanics.	Greek.
	German.	
3D TERM—	Mineralogy.	
	Physics. Rhetoric.	Chemistry.
	German Literature.	Cicero de Oratore.
	THIRD, OR JUNIOR YEAR.	
1ST TERM—	Astronomy.	
	Geology.	Ancient History.
	English Literature.	
2D TERM—	Geology.	
	Modern History.	Astronomy.
	Meteorology.	English Literature
3D TERM—	Logic.	
	Physical Geography.	English Literature.
	Modern History.	Butler's Analogy.

FOURTH, OR SENIOR YEAR.

1ST TERM—Mental Philosophy.
Political Economy. Science of Education.
Elements of Criticism.

2D TERM—Moral Philosophy.
History of Civilization. Social science.
Civil Polity, Const. of United States. Evidences of Christianity.

3D TERM—History of Philosophy.
Modern Philology.
Constitutional Law.
History of Inductive Sciences.

VII. PREPARATION FOR THIS COURSE.

Candidates for the general course in science, literature and art, shall pass thorough examinations in the studies ordinarily required for admission to good colleges or universities, with the exception of the Greek language, and the addition of algebra and geometry.

VIII. PREPARATORY CLASSES.

Special classes for instruction of such candidates for the general course, as may not be fully prepared to enter said course, may be organized from time to time by the Faculty; but the instruction in these classes shall not comprehend the studies ordinarily taught in the common schools.

IX. CANDIDATES FOR ADVANCED STANDING.

Candidates for advanced standing, shall pass examinations in all the previous studies of the course; but may be admitted to take any selected study for which they may be qualified, in any part of the course.

X. TUITION AND OTHER FEES.

Tuition to students from other States, per annum	$20 00
Matriculation fee, on entering the University	10 00
Incidental fee, for warming and care of public rooms, per term	4 00
Room rent, in University building, per term	4 00

There shall be no other charge for tuition to students from this State. Honorary and prize scholars shall have the preference in admission. [See substitute for this article, page 93.]

XI. PROFESSORS.

The committee recommend the appointment, at an early day, of at least three Professors; and are prepared to nominate to the Board, at any suitable time, two men for such Professorships. They have before them several other prominent names, but desire to take all the time that may be properly allowed, to make assurance doubly sure, that the best men are obtained. If the Board shall see fit to lodge with the committee the power to employ, temporarily, such additional teachers as may be needed for the spring term, it will allow nearly three-fourths of a year more to prosecute such inquiries as may help to fill, much more safely, these important places in the Institution; and the trial of some men in the spring term, will permit us to test their qualifications, before any permanent appointment.

XII. BOARDING HALL.

The committee recommend that a suitable person be employed to take the rooms designed for the boarding department, and maintain in the same a boarding hall, for such officers, students, and employees, as may desire board. They recommend that a suitable stove or cooking range, and tables and chairs for the dining room, be furnished, and that these articles be granted, free of charge for rent, to such person, and that he shall receive the amounts paid for board, as his compensation. He shall be required to keep the rooms and furniture in good repair, and restore them, when called for, in as good order and condition, ordinary wear excepted, as when he received them. The rates of board shall be as low as practicable, and shall be subject to revision by the Board and the Executive Committee.

XIII. ADDITIONAL COURSES.

Other courses of study will be organized as soon as the circumstances of the University will permit. The Military Department ought to partly develop at the outset.

Mr. McConnell moved to adopt the report.

Mr. Blackburn moved to so amend the report that "no matriculation fee" shall be demanded from honorary and prize pupils.

Adopted.

Mr. Hayes moved to further amend by adding, "but all other pupils shall be charged at the rate of fifteen dollars per annum for tuition; provided, however, that the Executive Committee shall have power to reduce or abate said charge, and to increase the number of honorary scholarships.

The yeas and nays were called for on Mr. Hayes' amendment, and taken, as follows:

Members voting yea were Messrs. Blackburn, Brown of Pulaski, Burchard, Burroughs, Dunlap, Edwards, Galusha, Harding, Hayes, Johnson, Lawrence, Mahan, Quick, Scroggs—14.

Members voting nay were Messrs. Allen, Bateman, Brayman, Cobb, Cunningham, Flagg, McConnell, McMurry and the Regent—10.

The amendment to the amendment was declared adopted.

Mr. Cobb offered the following as a substitute for the amendments of Mr. Blackburn and Mr. Hayes, and moved its adoption: "A matriculation fee of ten dollars each shall be charged all pupils in attendance; and all, except the honorary and prize pupils, shall be charged a tuition fee of fifteen dollars each, per annum."

The substitute was adopted.

Mr. Flagg moved to amend the substitute so as to charge twenty dollars per annum as tuition for pupils from other states.

On motion, the Board voted to lay the report upon the table until two o'clock this P. M.

Mr. FLAGG moved that the Board meet in private session, at three o'clock this P. M., to receive nominations and consider the appointment of persons as head farmer and professors in the University.

It was so voted.

On motion, the Board took a recess until two o'clock this P. M.

AFTERNOON SESSION.

Board convened at 2 o'clock. Regent in the chair.

The report of the Committee on Faculty and Course of Study was called up for the action of the Board.

RATES OF TUITION ADOPTED.

Mr. CUNNINGHAM offered the following substitute for Section 10 of the report, viz:

SEC. 10. TUITION AND OTHER FEES.

Tuition of students from other states	$20 00	per annum.
" " from Illinois	15 00	"
Matriculation fee of all students	10 00	"
Incidental fees for care and warming of public rooms, etc	2 50	per term.
Room rent in University building	4 00	"

Honorary and prize scholars shall be admitted without any charge for tuition.

It is the desire and intention of the Board of Trustees to make tuition free to all students from this State, at the earliest moment that the finances of the University will permit.

The section and accompanying declaration were adopted.

The report of the Committee, thus amended, was adopted.

Mr. QUICK, Chairman of Committee on Agricultural Department, offered an additional report. Inasmuch as this report included the appointment of the head farmer, it was, by vote of the Board, laid upon the table, to be made the special order for 3 o'clock.

Mr. COBB, Chairman of the Finance Committee, reported a list of estimates of the expenses of the University from this time until the March meeting of the Board, amounting to $24,424 06.

He also reported available funds to meet these expenses, as follows:

Due Jan. 1st, coupons upon $125,000 of Illinois 6 per cent. bonds	$3,750 00
Rents from farms	500 00
Leaving the probable expenses unprovided for	$20,174 00

The Committee recommended the sale of $20,000 of Champaign county bonds, to meet these expenses.

The Committee also recommend the sale of 100,000 acres of the land scrip, at 90 cents per acre.

The report was accepted by vote of the Board.

SALE OF SCRIP VOTED.

On motion or Mr. Burroughs, that portion of the report which related to the sale of land scrip was adopted.

Mr. Brown moved that the Treasurer be directed to sell the one hundred thousand acres of scrip at ninety cents per acre, as recommended by the Committee.

Carried.

SALE OF BONDS ORDERED.

Mr. Johnson moved that the Treasurer be authorized to sell twenty thousand dollars of Champaign county bonds, as recommended in report of the Finance Committee, at a price not less than par.

The motion prevailed.

LOCATION OF SCRIP AUTHORIZED.

Mr. Flagg moved that the Treasurer and Finance Committee be authorized to locate not to exceed twenty-five thousand additional acres of the scrip.

Carried.

Mr. Harding asked to be excused from farther attendance at this meeting; which was granted.

PRIVATE SESSION—3 P. M.

The Board went into private session, at 3 o'clock, agreeably to vote of the morning.

The report of the Committee on Agricultural Department was called up and presented, as follows, viz :

The Committee on Agriculture have had under consideration the subject of head farmer and salary, referred back to them, and have instructed me to report :

That they recommend filling the blanks in the eighth (8th) proposition of the report with the name of Jonathan Periam, and that his salary be fixed at fifteen hundred dollars ($1,500) per annum; and that he have, in addition, the use of the house on the Busey farm; and that his term of service commence on the first day of January next.

The Committee further suggest that there will be needed, to carry out the recommendations contained in the report, appropriations as follows:

For cost of two teams	$800 00
For harness for same	80 00
For two wagons	220 00
For feed for teams	100 00
Making a total of	$1,200 00

For this purpose the Committee recommend that one-half of this amount be set apart immediately to pay for one team, wagon and harness, and the balance by the first of March, 1868.

In regard to the fences around said farms, the committee are of opinion that the fencing already ordered for the Institution will be sufficient for present purposes.

The committee, however, recommend that the head farmer be instructed to make a hedge fence of Osage Orange, at as early a period as is practicable, around the lands designed to be kept by the Institution.

The committee also suggest and recommend that provision be made to pay the wages of at least two laborers on the farm, as soon as the head farmer shall deem their services necessary.

AGRICULTURAL IMPLEMENTS.

The committee are of the opinion, that upon proper application to the manufacturers of agricultural implements, one at least of each kind, may be secured to the Institution, free of charge. It will be manifestly to the interest of manufacturers to send their machines of different kinds here to be tested, as an indorsement by the officers of the Institution would be highly beneficial to the manufacturers, in making sales. The committee recommend the passage of the following resolution:

Resolved, That —— be instructed to correspond with the various manufacturers of agricultural implements, inviting them to donate to the University one at least of the various implements or machines, to be tested and used by the Institution, or placed in an exhibition hall, as the Board may elect, to form a permanent museum of agricultural implements.

HEAD FARMER CHOSEN.

On motion of Mr. DUNLAP, that portion of the report which recommended Mr. PERIAM as head farmer, was adopted.

Mr. FLAGG moved that the Chairman of the Agricultural Committee be instructed to contract with Mr. Periam according to the terms of this vote.

This motion prevailed.

On motion of Mr. DUNLAP, the blank in the resolution offered by the committee, was filled with the name of THOMAS QUICK.

The report was then submitted for vote of the Board, and adopted.

Mr. BURCHARD presented the following, viz:

Resolved, That the sum of twelve hundred dollars be appropriated for the purposes indicated in the report of the Committee on Agricultural Department, and that the Regent be authorized to draw, from time to time, warrants for such parts thereof as may be needed. The whole amount so drawn not to exceed the sum hereby appropriated.

Adopted.

The REGENT called Mr. CUNNINGHAM to the Chair, and presented the names of gentlemen as suitable persons to fill chairs as Professors in the University, and read testimonials in their favor, viz: William Baker, of Springfield, Illinois, and George W. Atherton.

PROFESSORS ELECTED.

Mr. CUNNINGHAM presented the following resolutions, and moved their adoption:

Resolved, That Professor William M. Baker be and he is hereby elected to a chair, hereafter to be named; his term to commence March 1, 1868, at a salary of two thousand dollars per annum.

Resolved, That Professor G. W. Atherton be and he is hereby elected to a chair hereafter to be named; his term to commence on the first day of March, 1868, at a salary of two thousand dollars per annum.

Each resolution was unanimously adopted.

Mr. McCONNELL moved to instruct the Regent to notify the gentlemen chosen as Professors, of their election.

Carried.

The private session was then closed, by vote of the Board.

OPEN SESSION—4 P. M.

Mr. GOLTRA, Chairman of Committee on Buildings and Grounds, presented the following report, which was adopted, viz:

1. We recommend that the work on the building, already begun, be finished, and the fence completed.

2. That this Committee be authorized to adopt a plan for laying out and ornamenting the University grounds, and that the work, whenever done, on the grounds, shall be in pursuance of this plan.

3. That the necessary black-boards, desks and seats for the recitation rooms, chapel and other public rooms of the University, be authorized to be made or procured.

(Signed), M. C. GOLTRA, *Chairman.*

Mr. LAWRENCE, Chairman of the Auditing Committee, reported bills of expenses of members, which the Committee had allowed.

On motion of Mr. HAYES, the report was adopted, and warrants ordered to be drawn for the several sums named.

EXPENSES OF MEMBERS—HOW PAID.

Mr. LAWRENCE moved that the bills of expenses of members of the Board, incurred in attending its meetings, with the items named therein, be forwarded to the Regent, who shall draw orders on the Treasurer for the same.

Carried.

APPROPRIATION FOR THE PURCHASE OF CABINET.

Mr. COBB submitted the following resolution:

Resolved, That the Regent be authorized to draw warrants on the Treasurer, in favor of the Chairman of Committee on Library and Cabinets, to the amount of four thousand dollars, to be used according to the previous vote of the Board.

Adopted.

APPROPRIATION FOR FENCES.

Mr. JOHNSON presented the following, and moved its passage:

Ordered by this Board, that warrants to the amount of fifteen hundred dollars, ($1500), be drawn, by the Regent, on the Treasurer, to finish the fencing of the grounds and buildings.

The resolution was adopted.

APPROPRIATION FOR PURCHASE OF LOTS.

Mr. CUNNINGHAM read the following resolution, moving its adoption:

Resolved, That the Regent be authorized to draw his warrants upon the Treasurer, in favor of the owners of the lots on the west side of the University grounds, in payment for the same, as per the report of the Executive Committee, in amount not exceeding two thousand four hundred and fifty dollars, ($2450).

It was adopted.

Mr. DUNLAP offered the following:

Resolved, That the office of Superintendent of Buildings and Grounds, as appointed by the Executive Comm'ttee, be continued until the next meeting of this Board.

On motion of Mr. BRAYMAN, this resolution was referred to the Committee on Buildings and Grounds, with instructions to report this evening.

SECRETARY AUTHORIZED TO PUBLISH.

Mr. BRAYMAN presented the following preamble and resolutions:

WHEREAS, this University was established for the benefit of the whole people of this State, whose intelligent support is necessary to its success; and,

WHEREAS, a diffusion of all such information as relates to the management and government of the University, is equally necessary to that support; and,

WHEREAS, the newspaper press is the proper and recognized means of communicating intelligence; be it, therefore,

Resolved, That the Recording Secretary of this Board, and Secretary of the Executive Committee, may furnish to such newspapers of this State as shall desire to publish the same for public information, such proceedings, orders and reports of this Board, or said Committee, as the Board or Committee shall at each meeting authorize, and that said Secretaries may, under authority of the Regent, in like manner furnish such matter while the Board and the Committee are not in session.

Resolved, That matters so furnished, shall not in any case include reports of discussions, nor relate to criticisms upon the Board or Committee, nor members thereof; but only such as shall be deemed useful for public information and beneficial to the University.

The preamble and resolutions were adopted.

Mr. ——— moved to take up, for consideration, the paper relating to lectures, which was read by the Regent this A. M., (in connection with the report of Committee on Faculty and Study).

Mr. McCONNELL moved that the lecture course be postponed until a year from next January. Carried.

Mr. FLAGG moved that the consideration of this paper be postponed indefinitely.

Which motion prevailed.

LABOR SYSTEM.

Mr. HAYES moved that the Regent and Committee on Faculty and Study be authorized to provide for carrying out the labor system recommended in their report. Carried.

Mr. HAYES moved that the Regent be authorized to issue the necessary circulars preparatory to the opening of the University. Carried.

OFFICE OF SUPERINTENDENT OF BUILDINGS AND GROUNDS DISCONTINUED.

Mr. GOLTRA, Chairman of the Committee on Buildings and Grounds, to which the resolution of Mr. Dunlap was referred, relating to the continuation of the office of Superintendent of Buildings and Grounds, reported verbally, recommending that the resolution be not passed.

This report was adopted.

BILLS AND ACCOUNTS AGAINST THE UNIVERSITY—HOW TO BE MADE.

Mr. DUNLAP presented the following:

Resolved, That, hereafter, all accounts and vouchers made to the Illinois Industrial University, shall be made to the Illinois Industrial University, and not to any officer or employee of the Institution; and no other accounts or vouchers shall be received or paid by the Regent: *Provided*, that memoranda and receipts for traveling expenses may be made to the person traveling on business of the University, to be filed with the regular vouchers.

Adopted.

CIRCULARS ON EXAMINATION OF STUDENTS.

Mr. BURCHARD moved that the Regent be directed to embody the instructions relating to the examination of students, in the circulars which he has been ordered to issue.

Carried.

RESOLUTION RESPECTING RAILROADS.

Mr. HAYES presented the following, and moved its adoption by the Board:

Resolved, That this Board disavow and disapprove of any attempt on the part of the Executive Committee, or any other Committee of this Board, to grant or allow to the Danville, Urbana, Bloomington and Pekin Railroad Company, or any other Railroad Company, the right of way over any of the property of this Institution; and that none of the real estate of this Institution, nor any easement or right of way upon the same, shall be given, granted or sold, without the direct authority of a vote of the Board.

The resolution was adopted.

Mr. HAYES moved that the Regent, in his discretion, be instructed to serve a copy of this resolution upon the proper officers of the said Railroad Company; and, if necessary, to take legal counsel and other steps necessary to defend the lands of this Board, as contemplated in this resolution.

The motion was carried.

On motion, the Board adjourned until seven o'clock this evening.

EVENING SESSION.

November 27th, 1867.

The Board met at appointed time. REGENT in the chair.

ADOPTION OF REPORT OF COMMITTEE ON HORTICULTURAL DEPARTMENT.

Mr. BRAYMAN moved that the report of the Committee on Horticultural Department be taken up.

It was so voted by the Board, and the Secretary read the report.

On motion of Mr. FLAGG, the report of the Committee was adopted.

Mr. GOLTRA, Chairman of Committee on Buildings and Grounds, stated to the Board that the collision between the provisions of this report and the instructions given to said Committee, in reference to the laying out of the grounds, would be obviated by the mutual co-operation of the two Committees charged with this work.

Mr. BRAYMAN moved that the Chairmen of the Committees on Agriculture, Horticulture and Buildings and Grounds constitute a Committee, with power to carry out the provisions of this report, and that the Regent be instructed to draw upon the Treasurer orders for expenses incurred in said work.

Carried.

Mr. HAYES moved that the Regent and Mr. Dunlap constitute a Committee, with instructions to complete the arrangement with Mr. Busey for delivering to this Board possession of the "Busey farm" upon the first day of January next.

This motion prevailed.

INSURANCE OF UNIVERSITY BUILDING.

The following resolution, presented by Mr. COBB, was adopted by the Board:

Resolved, That the Regent and Mr. Cunningham effect such insurance on the University building as they may deem proper, and that the Regent draw a warrant to cover the premium.

Mr. BRAYMAN moved that the minutes of the last meeting of the Executive Committee be approved, except such as relate to the right of way of railroad, and such as is modified by the motion of Mr. HAYES, relating to the possession of the "Busey farm."

The motion *prevailed.*

APPROPRIATIONS FOR LIBRARY, APPARATUS, ETC.

Mr. COBB presented the following resolution, moving that the Regent be authorized to draw warrants for the several sums named, viz:

Resolved, That in addition to the sums heretofore appropriated, warrants be drawn for the following purposes, not exceeding the amounts specified for each, as per estimates of the Finance Committee:

For the completion of improvements on buildings and grounds....	$2000
For furnishing chapel, recitation rooms, library and cabinet cases............	1950
For library, to be expended under the direction of Library Committee.......	1000
For chemical and philosophical apparatus................................	500
For lumber for fences and repairs................................	500
For furniture for kitchen and dining room................................ ...	650

The resolution, with the motion, was submitted to vote and adopted.

Mr. CUNNINGHAM presented the following resolution, which, on motion of Mr. HAYES, was laid upon the table, viz:

Resolved, That no motions or resolutions brought before this Board be entered upon the record of its proceedings, except such motions and resolutions as prevail: *Provided*, That any motion or resolution shall, at the request of any member, be entered upon the minutes with the vote thereon.

Mr. COBB offered the following resolution and moved its adoption:

Resolved, That J. C. Cunningham be authorized to sell the "Griggs farm," or any portion thereof, at not less than sixty dollars per acre. Terms, twenty per cent. down, and the balance on ten years time, at eight per cent. interest, payable annually.

The resolution was put to vote and lost.

PRIZE SCHOLARSHIPS.

The REGENT made a verbal report to the Board of the measures which he had adopted to bring the aims and plans of the University before the people of the State.

He had attended the State Fair and County Fairs and other gatherings, giving public addresses at each.

He had proposed to the people of the several counties addressed to raise a fund of one thousand dollars in each, by subscription; which fund should be safely invested, and the interest thereon used to aid in defraying the expenses of one student from the county, while attending the University—said student to be the most successful

competitor at an impartial examination to be conducted in such manner as the officers of the County Agricultural Society and Regent of the University may provide.

Several counties had already thus provided for "prize scholarships" in the University, and had also contributed the sum of thirty dollars in each, to assist their students during the spring term of 1868.

Mr. FLAGG moved that this Board warmly approve the plan of the Regent in regard to prize scholarships.

Carried.

INAUGURAL EXERCISES VOTED.

Mr. BURROUGHS presented the following preamble and resolutions, moving their adoption by the Board:

WHEREAS, the opening of this State University is an event of much importance and public interest, and as such, deserves to be signalized by fitting solemnities; therefore,

Resolved, That the eleventh day of March, 1868, be appointed for the formal opening of the University.

Resolved, That the Regent be requested to deliver the Inaugural Address upon that occasion.

Resolved, That his Excellency, Richard J. Oglesby, and the Hon. Newton Bateman, the respected State Superintendent of Public Instruction, be requested to make suitable addresses on the occasion.

Resolved, That a Committee of five be appointed to make the necessary arrangements for the proper celebration of this inauguration of the work of the University.

The motion to adopt the preamble and resolutions prevailed.

Messrs. Burroughs, Cobb, Brayman, Cunningham and Hayes were appointed said Committee.

VOTE ON SALE OF SCRIP.

Mr. CUNNINGHAM presented a resolution, as follows:

Resolved, That the Regent prepare a report of the names of members of this Board who gave consent, in writing, to the sale of one hundred thousand acres of land scrip, sold in pursuance of the suggestions of the Executive Committee, at their June meeting, and that such report be entered upon the record by the Secretary, or submitted at this meeting.

Adopted.

The REGENT reported the names as follows: Messrs. Dunlap, Scroggs, Cunningham, Cobb, Van Osdel, Pickrell, Quick, Mahan, Lawrence, Topping, A. M. Brown, Galusha, Burroughs, Burchard,

Brayman, Bateman, E. S. Brown, Flagg, Goltra, Allen, Blackburn and Gregory, (22).

The REGENT exhibited to the Board a collection of imitations of various fruits and roots, presented to the Board by the manufacturers, Messrs. Hovey & Nichols, of Chicago, to be placed in the museum of the University.

On motion of Mr. HAYES, it was

Resolved, That a vote of thanks be tendered to Messrs. Hovey and Nichols, for the imitations of fruits presented to us; and, further, that we express our admiration of the skill displayed in their construction.

The vote passed unanimously.

On motion of Mr. DUNLAP, the Secretary was instructed to furnish Gen. MASON BRAYMAN a certified copy of his report as Chairman of Committee on Military Department.

The Board then adjourned.

O. B. GALUSHA, *Recording Secretary*.

SECOND ANNUAL MEETING—MARCH 10, 1868.

The Board met in the University building, March 10th, 1868, at ten o'clock, A. M.

The meeting was called to order by the Regent, who conducted the devotional exercises.

Upon the call of the roll, the following members were present, and answered to their names, viz: Messrs. Allen, Blackburn, Brayman, Burchard, Cunningham, Galusha, Goltra, Johnson, Mahan, McMurray, Pickrell, Pullen, Quick, Scroggs, and the Regent—15.

As seventeen members are required for a quorum, for the transaction of business,

Mr. ALLEN moved that the Board take a recess until three o'clock, this afternoon; which was agreed to.

THREE O'CLOCK, P. M.—MARCH 10.

The Board re-assembled, and was called to order by the Regent.

The roll was called, and the following members responded, viz: Messrs. Allen, Blackburn, Brayman, Burchard, Burroughs, Cunningham, Dunlap, Galusha, Goltra, Johnson, Mahan, McMurray, Pickrell, Pullen, Quick, Scroggs, and the Regent—17.

The REGENT announced that a quorum was present.

On motion of Mr. GOLTRA, the reading of the minutes of the last meeting was deferred.

The CHAIRMAN announced that the reception of communications was in order, when Mr. *CUNNINGHAM* presented the following:

PETITION FOR SITE OF SCHOOL HOUSE.

To the Board of Trustees of the Illinois Industriul University:

The undersigned, Board of Directors of School District No. 1, Township No. 19, Range No. 9, would respectfully represent that the farm owned by the University, known as the "Busey Farm," occupies a position near the center of said district, and that the legal voters therein have, by unanimous vote, selected as a site for a school house about to be built for the use of said school district, a point near the southwest corner of the northwest quarter of the northwest quarter of section 19, township 19, range 9, being a part of said Busey farm: *Provided*, the permission of your Board to such location be granted.

We, therefore, respectfully ask that your permission to such location, and the use of one acre of land, be given, upon such terms as may seem right and just.

(Signed) S. P. PERCIVAL,
JESSE BURT,
THOMAS LINDSEY.

On motion of Mr. CUNNINGHAM, this petition was referred to the Committee on Agricultural Department

TREASURER'S REPORT.

The Treasurer presented his report, as follows:

ILLINOIS INDUSTRIAL UNIVERSITY,

In account with JOHN W. BUNN, *Treasurer.*

DR.

To amount paid for lands and lots	$15,511 00
" " locating scrip	2,544 33
" " postage and expenses selling	411 12
" " Regent's salary	3,666 66
" " Powell's Scientific Expedition	500 00
" " library	1,000 00
" " insurance	286 68
" " cut stone	1,280 00
" " lumber, etc	1,570 62
" " labor and materials	3,715 08
" " furniture and carpets	898 05
" " grading	722 32
" paid on account of farm	716 60
" " for expenses	1,891 24
	$34,713 70

CR.

By $40,000 Champaign county Bonds	$40,000	
By interest on $125,000 Ill. bonds	3,750	
By rent for farm	1,500	
		$45,250 00
		$10,536 30
By balance	$10,536 30	

SPRINGFIELD, ILL., March 11, 1868.

The Treasurer also presented a statement of sales of scrip, and of the investment of funds derived therefrom.

Mr. JOHNSON moved that the report of Treasurer be referred to the Auditing Committee.

It was so referred.

Mr. DUNLAP offered the following resolution—moving its adoption:

Resolved, That the Recording Secretary be directed to make an annual detailed statement of all warrants drawn on the Treasurer, the date of each warrant, the name of the person to whom payable, on what account drawn, and whether by the Board of Trustees or by the Executive Committee, with page of the record authorizing the same.

On motion of Mr. BRAYMAN, the resolution was referred to the Finance Committee.

DR. GEO. VASEY'S PROPOSITION.

Mr. MAHAN asked leave to read a communication from Dr. Geo. Vasey; which being granted, he read as follows:

There are in the State of Illinois about 1500 species of plants, including the Mosses and higher forms of Cryptogams.

Of this number there are 106 species of true grasses, 105 species of Cyperaceæ or Sedge grasses, and 12 species Irmcacæ or rush grasses—making in all 223 species of grasses and grass-like plants, or nearly one-sixth the whole number of species in the State.

There are also about 80 species of Forest Trees in the State, besides a large number of shrubs, which do not attain the magnitude of trees.

It would seem that persons seeking to attain the position of *educated* Farmers, especially, ought to have a practical acquaintance with the trees of the forest, to be able to distinguish the different kinds and to understand the various uses to which they are applicable. It also seems especially desirable that such persons should obtain an acquaintance with the native grasses and grass-like vegetation of the country in which they reside, as by such an acquaintance they might learn what kinds are best adapted to the various kinds of soil, what species it would be advantageous to cultivate and what to eradicate.

Every teacher in the department of botany, especially of practical and economic botany, will appreciate the great importance of a good Herbarium. It is the best possible substitute for a collection of the living plants, and a few minutes study of a well prepared specimen will give a better idea of a plant or tree than hours of description alone. Besides, a collection put up under the hands of a competent person possesses an *authority*, and is in a measure *decisive* as to the name and character of species, and is therefore of the greatest value as a *reference*, in cases of doubt. The specimens here presented * are designed to illustrate the general character of my specimens, and the style in which they should be arranged in the Herbarium.

* This paper was accompanied by a collection of grasses, plants and forest trees put up in a tasteful manner.—*Rec. Secretary.*

I propose to furnish a collection, after the style of the specimens presented, to the number of about 2000 species, comprising the principal part of the plants of this and the adjoining States. The cost will be twenty dollars per hundred species. It would be much better if all the labels were printed, but I can not furnish printed labels for a smaller order than 2000 species. The specimens are fastened by glued strips to sheets of heavy lithographic paper. The specimens of forest trees are attached to light paste-board sheets. Each species has a label attached to the right hand lower corner of the sheet. All the species of a genus are inclosed in a sheet or wrapper of heavy brown manilla paper, and the name of the genus given at the left hand upper corner. The whole to be put into boxes of paste-board or binders' board.

It will probably require six months to complete the collection.

(Signed) GEORGE VASEY.
Richview, Washington Co., Ill.

On motion of Mr. MAHAN, the communication was referred to the Committee on Library and Cabinets.

REPORT OF CORRESPONDING SECRETARY.

Mr. FLAGG having arrived, the Regent called for his report as Corresponding Secretary.

Mr. FLAGG stated that he had in course of preparation (and hoped soon to complete) his annual report, required by the act of the General Assembly of this State, creating this Board. He also gave his views in respect to the duties of his office, as prescribed by law.

On motion of Mr. BLACKBURN, the Board adopted the following resolution:

Resolved, That the verbal report of the Corresponding Secretary be accepted; and that he be directed, in his discretion, with the approval of the Regent, to publish a printed report for the last year, as required by law.

On motion of Mr. BURCHARD, the Regent was instructed to draw a warrant on the Treasurer, in favor of Mr. FLAGG, to the amount of $39 80, for expenses incurred in prosecuting the duties of his office during the past year.

The REGENT presented a report from Mr. PERIAM, "Head Farmer," which, on motion of Mr. BRAYMAN, was referred, without reading, to the Committee on Agricultural Department.

EMPLOYMENT OF A MECHANIC.

On motion of Mr. JOHNSON, it was

Resolved, That inasmuch as this Board, at a former meeting, had authorized the Committee on Buildings and Grounds to employ a mechanic for the Institution, and *since the said committee* has contracted with J. S. Scarfoss, at a salary of $1000

per year—that they be instructed to notify the said Scarfoss that his term of service will commence at the discretion of the Regent.

REPORT ON AGRICULTURAL IMPLEMENTS.

Mr. QUICK, Chairman of the Committee appointed to solicit donations of Agricultural Implements, etc., presented the following

REPORT:

The undersigned, committee appointed to solicit donations of Agricultural implements and machines from the various manufacturers of this State, respectfully reports as follows:

That he caused application to be made to the various manufacturers to make donations in accordance with the resolution of the last meeting of this Board. That, believing but little could be accomplished by writing letters, he procured the services of Jonathan Periam, Superintendent of the University farm, who, by his residence in Chicago, had become personally acquainted with many of the leading manufacturers, to call, in person, and lay the matter before them and solicit donations, and to write to such as he failed to see. In pursuance of that arrangement, Mr. Periam waited upon a large number of the manufacturers, and wrote over two hundred letters soliciting donations. The following is the result of his labors, as furnished by himself:

Donations procured by letter to the amount of $114; donations by personal solicitation, $282; at an expense, for traveling expenses, hotel bills, correspondence, etc., of $51 15—making the amount of donations equivalent to three hundred and forty-four dollars and eighty five cents ($344 85), up to the present time, after deducting expenses in procuring the same.

The value of machines *received*, up to this time, is $264 50, and machines promised to the value of $132. The names of the donors, the kinds of implements, and their value, we give as follows:

One set of Mats, donated by L. Vandesyde, of Calumet	$5 00
One Subsoil Attachment, donated by R. P. Wheatly, DuQuoin............	10 00
One Vandevire Corn Planter donated by Barlow, Wood & Co., Quincy.....	85 00
One Walking Cultivator, donated by Furst and Bradly, Chicago..........	30 00
One Jones' Corn Planter, donated by Emerson & Co., Rockford...........	12 00
Fifty small Sash, donated by Fuller, Palmer & Co., Chicago......	12 50
One Gorham Seeder and Cultivator, donated by Clark & Utler, Rockford..	75 00
One Farm Pump, donated by Wm. Lintner & Co., Decatur................	12 00
One Rotary Harrow, donated by I. I. Inglehart, Matteson................	16 00
Garden seeds, donated by S. Wilber, Momence..........................	7 00
	$264 50

The following implements are promised, but not received:

One Cast-Steel Plow, H. H. Taylor, & Co., Chicago.......	$30 00
One Walking Cultivator, and set of Plows, Hapgood, Young & Co., Chicago	102 00
In the aggregate..	$132 00
Which, added to donations received, makes a total of................ ...	396 50
From which deduct expenses..........	51 15
And there remains	$345 50

[A slight *discrepancy in the estimates—Rec. Sec.*]

Your committee further report, by the same authority, that many of the leading manufacturers have signified their willingness to furnish any of the more expensive implements, manufactured by them, at half price: and several agents at two-thirds of their value. Believing it to be due to the gentlemen who have made donations, and signified their willingness to furnish additional implements at reduced prices, that the Board should give an expression of their feelings in relation thereto, your committee offer, for the consideration of the Board, the following resolution:

Resolved, That the thanks of this Board, and of the friends of Industrial education throughout the State, are due to the honorable gentlemen, whose names are herein given, for the liberality and public spirit manifested by them in furnishing to the University implements for the institution, and to illustrate Agricultural and Mechanical science.

All of which is respectfully submitted.

(Signed) T. QUICK, *Chairman.*

The report was adopted.

Mr. JOHNSON moved that the accounts now in the hands of the Regent, be referred to the Auditing Committee for settlement; which was agreed to.

INVITATION TO REPORTERS FOR THE PRESS.

On motion of Mr. BURROUGHS, it was

Resolved, That this Board appreciates the interest taken in its proceedings by the newspaper press of the State, and cordially invites the representatives of the different papers to all meetings of the Board, and to make full reports of all proceedings, excepting such as the Board may indicate or wish to withhold.

ADJOURNMENT.

On motion of Mr. JOHNSON, the Board adjourned until half-past seven this evening.

EVENING SESSION—MARCH 10.

Board re-assembled at 7½ o'clock.

The REGENT presiding.

The roll was called, and nineteen members responded.

The REGENT called Mr. BURROUGHS to the chair, and reported, verbally, the steps which he had taken in regard to ornamenting the college grounds.

COMMITTEE TO RECEIVE TREES FROM MR. DUNLAP.

On motion of Mr. PULLEN, Messrs. Regent and Cunningham were appointed a committee, who were instructed to associate with them Mr. Periam, and receive so many of the trees which are due to this Board, from Mr. M. L. Dunlap, as may be needed for this spring's planting.

MR. PICKRELL'S RESOLUTION ON PRINTING.

Mr. PICKRELL read the following preamble and resolution, moving its adoption:

WHEREAS there seems to be vague conceptions, on the part of the public, of the official acts and doings of the Board of Trustees of the Illinois Industrial University; and,

WHEREAS, there have been grounds of complaint on account of the non-publishing of the proceedings of the Board in some public journal; and,

WHEREAS, we deem it but just to ourselves, as a Board of Trustees, that the public should see our *entire proceedings*, in order to judge correctly of our motives and doings—therefore,

Resolved, That the Recording Secretary shall prepare and publish the entire proceedings of the Board and Executive Committee in the ———, at this and all subsequent meetings, as soon as practicable after the adjournment of said meetings.

The resolution was discussed by Messrs. Pickrell, Quick, Flagg, McMurry and Dunlap.

Mr. GOLTRA moved that the preambles and resolution be laid upon the table; which motion prevailed.

RESOLUTION ON THE NON-ATTENDANCE OF EDWIN LEE BROWN.

Mr. JOHNSON presented the following and moved its adoption, viz:

WHEREAS, Mr. Edwin Lee Brown, of Chicago, has been appointed one of the members of this Board, and has never attended its meetings—therefore,

Resolved, That the Governor be informed, by the Regent, of said non-attendance, and that he be requested to recall said appointment, and make a new one, of some man who will feel called upon to attend the meetings of said Board.

Mr. SCROGGS moved to lay the resolution on the table. Lost.

Mr. MAHAN moved to postpone the consideration of the resolution until to-morrow; which motion prevailed.

Mr. CUNNINGHAM, from Committee on preparation for Inauguration, presented a partial report, asking privilege of completing and printing the same; which was granted.

ADJOURNMENT.

The Board then adjourned until eight o'clock to-morrow morning.

INDUSTRIAL UNIVERSITY, MARCH 11, 1868.

The Board of Trustees met, as per adjournment, and was called to order, at 8½ o'clock, by the Regent.

Devotional exercises were conducted by Rev. Mr. Riley, of Urbana.

Mr. QUICK was called to the chair.

On the call of the roll, the following members responded, viz:

Messrs. Allen, Blackburn, Brayman, Burchard, Burroughs, Cobb, Cunningham, Dunlap, Flagg, Galusha, Goltra, Harding, Hayes, Johnson, Mahan, McMurry, Pickrell, Pullen, Quick, Scroggs, VanOsdel and the Regent—22.

Mr. QUICK, Chairman of Committee on Agricultural Department, reported, viz:

The Committee on Agriculture, to whom was referred the Head Farmer's communication to the Regent, respectfully report, that they have had the same under consideration, and find the suggestions therein contained, in the main, practical, and recommend that the same be referred back to the Regent and Professor of Agriculture, to be carried into effect, as far as, in their discretion, the same can be done advantageously to the Institution.

Your Committee further recommend that the sum of ten hundred and forty-five dollars ($1045) be placed at the disposal of the Head Farmer, for the purchase of two teams, and the necessary plows, cultivator, mower, rake, etc.

(Signed) T. QUICK, *Chairman.*

This report was approved.

ANNUAL REPORT OF REGENT.

The REGENT presented his annual report, as follows:

The by-laws of the University make it the duty of the Regent to "make an annual report to the Board, exhibiting the progress and condition of the several departments of the University, with such suggestions as he may deem needful for their improvement."

The work of the year just closed has been preparatory in character, and its history is simply the record of the several steps taken for the organization of the depart-

ments and the preparations of grounds, buildings and apparatus for the proper work of the institution. Immediately after the Board meeting held the 7th day of May, 1867, at which the location of the University was finally fixed, contracts were made for stone and other materials for the necessary alterations and improvements of the University buildings. A contract was also made for grading the grounds, as directed by the Board. While these contracts were being fulfilled, the necessary measures were taken for the sale of the scrip, ordered by the Board to be sold, and for the location of such as was ordered to be located.

In August, the grading being nearly completed, and the cut stone being ready, the work was begun in earnest upon the building, and it has been steadily pushed forward with vigor, several men having been employed all the winter. After the Board meeting in November, I held a conference with the mechanics, and arranged with them to prosecute the work with such speed that all should be fully completed before the time set for the opening of the term. The work on the interior was fully completed as proposed, though much more was found to be done than was anticipated, and the materials are prepared for the completion of the portico; but the continued cold weather and the subsequent almost continuous rains have, till the present, prevented the work from being put in place. Two or three days of fine weather will serve to finish it. It ought to be stated that Mr. VanOsdel of Chicago, was requested by the Executive Committee to prepare plans for the portico, but his drawings having been in some way detained in the Express Office, the then acting Superintendent procured other plans from a master builder in Champaign, and the work was commenced upon these latter plans. But after the last Board meeting, finding Mr. VanOsdel's plans lying in the Express Office, I directed that these plans should be followed.

The winter set in so soon after the meeting of the Board that nothing could be done towards completing the fences around the grounds, except to procure the additional materials. As soon as the ground is sufficiently settled to set the posts, this work will be finished at once. The fact that with all this effort the work is not entirely done, evidences the wisdom of the policy of the Board of delaying the opening of the Institution till this spring. It is now clear to every reasonable man that it would have been impracticable to get the building in readiness to open in the fall; even if the more difficult work of ripening the plans, securing a faculty, and sufficiently advertising the opening could have been effected.

The delay has given time to make the institution known. Had the opening been delayed till the coming autumn, even greater advantages would have been gained.

While the mechanical work on the building and grounds was going forward, strenuous efforts were put forth to awaken public interest in the University—to secure an understanding of its plans, and to secure students. A system of prize scholarships was proposed to raise the endowment of, at least, one such scholarship in each county of the State. A competitive examination was provided for throughout the several counties for honorary and prize scholars, and examination papers were received from a majority of the counties, showing that thus, at the outset, the interest in this examination had extended very widely, and affording great encouragement that in the future it may become an element of great power and usefulness both to the Public School interests of the State and to the University itself.

It is certain that this examination has brought into the University several students who would never have come but for this influence, and we may reasonably conclude that if the plan shall be *hereafter prosecuted efficiently*, it will lead hundreds into

courses of liberal education who would otherwise remain in ignorance. It is worth our most earnest efforts to give permanency to these examinations.

On the second day of March, as ordered by you, the building being in readiness in all its interior arrangements, the University was opened for students and the work of instruction was at once begun. About fifty students appeared the first morning, and the number has been daily increasing through the week which has now elapsed till we have now in attendance sixty-eight students, two others having been called home, one by sickness and one by business. Several applicants have delayed their entrance till other engagements are fulfilled, while a large number have notified us of their intention to be present in the autumn

Considering the season, our attendance is large—much larger indeed than is often seen in the opening of such Institutions. Considering the untried character of many of our plans, the number is full large enough for the most successful economical inauguration and trial of these plans.

FINANCES.

The finances of the University will demand a close and constant attention. Our safety and ultimate success will depend on the financial soundness of the enterprise. The reports of the Treasurer and Finance Committee will furnish you the more material facts in regard to the present condition of the finances. I must refer to them for a statement also of the amount of our permanent funds, and the character and productiveness of the same. The entire expenditures for the year, for all purposes, have been $34,742 63. The several items of this expenditure will be shown by the warrant statement accompanying this report. A classified statement will also be handed in with this report exhibiting the expenditures under the proper heads

The necessity of making a considerable addition to the working Faculty at the opening of the next academic year will compel a close inquiry into the probable income for the year. I suggest also the inquiry whether $5000 of the proceeds of Champaign County Bonds, converted, may not and ought not to be at once reinvested. The receipts from students, and the interest due the 1st of May from the $100,000 of Champaign County Bonds will furnish all the funds necessary to meet the current expenditures of the Institution till the next installment of interest is received.

THE FARM AND GARDEN.

The Head Farmer appointed by you, Jonathan Periam, Esq., of Chicago, entered upon service the first of January, and has been actively employed, and with great fidelity, in the preliminary work and other preparations for the season. His report, which I herewith communicate, will furnish you with a statement of the present condition and proposed treatment of the lands. The attention of the Board should be given early to devising plans for the necessary barns, tool-houses and other farm and garden buildings. These buildings when erected should be model structures, and therefore the most careful and extensive inquiry will be needed to secure this result.

MECHANICAL DEPARTMENT.

The proper development of the Mechanical Department will demand some suitable buildings, with perhaps a supply of motive power in the shape of a steam engine. Parts of the buildings erected for this department may be rented, with some portions of the motive power, to representatives of several of the more prom-

inent branches of the mechanic arts, as workers in iron, in brass, in wood, and in the typographic arts, who may furnish ready illustrations of these arts, and allow such students as desire it an opportunity to acquire some practical knowledge of these several trades and their tools.

Rooms may be reserved for such shops as may be needed for the work of the University, and its several departments.

The possession of a good steam engine will not only furnish the students of mechanical science an opportunity to become familiar with the management of this great motor, but will also provide opportunities, when occasion arises, for experiments in the manufacture of sugar from the beet and sorghum, of cheese, and other products from the garden and farms.

I call this early attention to this subject, that the Board may secure wise and well digested plans for the future development of this important department of our work.

APPROPRIATIONS.

Appropriations will be needed soon for the following objects, viz: A bell of sufficient power to be heard over the farm. A good eight-day clock, and perhaps for three or four other clocks to furnish the recitation rooms. These latter are not asked for at present. An additional number of garden tools, for the garden and grounds.

The Committee on Buildings and Grounds will bring before you the further expenditures necessary to preserve the buildings; and the Library Committee will explain to you the necessity of further appropriations for books and apparatus.

It is especially important that an appropriation should be made to fit up, at once, a chemical laboratory.

In this connection, I would ask that the Regent be authorized to employ such clerical aid as may be necessary from time to time, to write up the accounts of the several departments, and to take some care of the library. I have already employed Mr. A. Potter for several days to assist in labeling and putting up the books, and in preparing the warrant statements which accompany this report. The crowd of labor which fell upon me in connection with the examinations for scholarships, and the preparations for the opening, compelled me to solicit the aid of Prof. Atherton, and I ask, accordingly, that his term of service be counted from the first day of February, and that a warrant be issued for his salary for that month.

HONORARY SCHOLARSHIPS.

The law authorizes the Board to make additional honorary scholarships, and provides that these need not be confined to the children of soldiers and sailors. The report of the Committee on Courses of Study recommended that the Regent be authorized to award the unclaimed scholarship of any county to some worthy student from some other county.

I would suggest, also, that a rule be established, that upon the failure of applications from sons of soldiers and sailors, the honorary scholarships may be awarded to other worthy young men by the Faculty, in their discretion.

This would be, in effect, simply to establish other honorary scholarships, as the Board has authority to do, the additional scolarships being contingent upon failure of applicants for those provided by law.

THE LAND SCRIP AND LANDS.

The attention *of the Board is also respectfully* asked to the questions concerning *the lands already located, and the policy of* making further locations. A pruden

regard for the interests of the University, and justice to the States in which our lands are located, seem to demand that the earliest practicable measures shall be taken to bring these lands into market, and to induce actual settlers to purchase them. If the lands should be properly catalogued and described, and some order be made for their sale at stipulated prices, doubtless we might soon begin to realize something from them.

An order is now on your records for the location of 25,000 acres additional to those before located. This, you will recollect, leaves you 50,000 acres of scrip undisposed of. Ought not some power to be lodged in the Finance or Executive Committee to take advantage of the market, if a sale is to be made, or to locate if they find it desirable to make further locations? I offer this suggestion with much diffidence, because of the importance of the interests involved, and the difficulty of devising any policy against which serious objections do not lie.

In closing this hastily prepared report, I cannot but congratulate you, gentlemen, on the success that has thus far attended your labors. Your plans have received he warm commendation of many of the best and wisest men, both in our own and other States. The few hostile criticisms which have found their way to the public eye or ear, have been based either upon an innocent misunderstanding or an intentional misrepresentation of our course and purposes. They have shown on their face that they were the productions of minds too narrow to comprehend the real aims of the University, or too prejudiced to judge it fairly. Such criticism will not seriously harm us. It may catch, for a moment, the unsuspicious, and may serve to feed a little the rancor of the unfriendly; but our triumphant success will more than vindicate us, and our noontide sun will shine all the brighter for the clouds which obscured its dawning. Invoking the blessing of a benificent Heaven upon our work, and commending it to the wise charities of our fellow citizens, it remains only for us to move steadily forward, with unfaltering purpose and humble trust, to the great ends set before us.

[Signed] J. M. GREGORY.

The Regent presented his statement of warrants, in the words and figures following, viz :

STATEMENT OF WARRANTS DRAWN BY REGENT.

Date.	No.	To whom.	Objects.	Amount
May 9, 1867..	1	Congregational Church...	Services of Sexton....................	25 00
"	2	I. S. Mahan..............	Expense at first Board meeting.........	22 00
"	3	J. O. Burroughs..........	" " "	25 00
May 31, 1867.	4	Lemuel Allen	" " "	20 20
"	5	Alex. Blackburn..........	" " "	18 10
"	6	A. M. Brown.	" " "	20 10
"	7	H. C Burchard	" " "	23 10
"	8	Emory Cobb..	" " "	14 65
"	9	J. O. Cunningham........	" " "	15 00
"	10	M. L. Dunlap......... ...	" " "	16 10
"	11	Samuel Edwards..........	" " "	23 95
"	12	W C Flagg..	" " "	15 00
"	13	George Harding..........	" " "	21 75
"	14	O. B. Galusha	" " "	11 50
"	15	M. C. Goltra.............	" " "	9 00
"	16	J P. Hungate	" " "	29 65
"	17	John S. Johnson.........	" " "	23 50
"	18	A B McConnell..........	" " "	6 00
"	19	J H. Pickrell............	" " "	6 70
"	20	Thomas Quick.	" " "	23 15
"	21	J. W. Scroggs	" " "	16 10
"	22	C H. Topping............	" " "	20 75
"	23	John M VanOsdel . .	" " "	20 00
"	24	B Pullen	" " "	20 90
June 11, 1867	25	James Rea...............	Services as Recording Secretary........	125 00
June 14, 1867.	27	Thomas Quick............	Expenses for meeting of Board and Com.	55 35
"	28	I. S. Mahan	" " "	49 45
"	29	J. M VanOsdel..	" " "	41 00
June 15, 1867.	30	A. O Woodworth.........	Land—block 53, in Urbana.......	250 00
"	31	A. O. Woodworth.........	Land—Lot 4	100 00
"	32	A. O. Woodworth	Land....	100 00
"	33	A. O. Woodworth........	Lot 4	100 00
"	34	A O Woodworth. . .	Land—Lot 4	200 00
"	35	Smith & Kinney..........	Grading	100 00
"	36	J M. Gregory	Salary for May......	333 33
June 17, 1867.	37	Ermantrout & Alexander	Lots of Champaign county.	4,979 50
June 18, 1867.	38	William W. Strong	Furniture	464 00
July 2, 1867 .	39	Smith & Kinney...	Grading..................................	150 00
July 5, 1867..	40	J. M. Gregory	Salary for June	333 34
"	41	J M. Gregory	Stationery for Regent's office and Treasurer's expenses.................. ..	64 15
July 6, 1867.	42	O. O. Alexander.........	Recording deeds	18 65
July 10, 1867.	43	J O. Cunningham .. .	Purchase of lands for University........	7,279 50
July 18, 1867.	44	J H. Pickrell	Expense at two meetings	21 45
July 20, 1867.	45	S. Edwards.	Expense at meeting of Board.	25 75
"	46	Smith & Kinney.	Grading on contract.....................	250 00
July 23, 1867.	47	B. Pullen	Expense at May meeting..	23 45
"	48	H C Burchard...........	" "	24 50
"	49	L. W Lawrence	" "	16 30
"	50	A. M. Brown.	" "	29 65
"	51	Lemuel Allen............	" "	25 00
"	52	O. B. Galusha	" "	21 60
July 24, 1867.	53	J. M. Gregory	Locating land scrip, by M. C. Goltra .	250 00
Aug. 2, 1867 .	54	J. M. Gregory	Expenses and fees for locating land scrip	500 00
Aug. 23, 1867	55	M. C. Goltra....	Expenses and fees allowed for locating land scrip	700 00
Aug. 23, 1867.	56	W. C. Flagg.........	Expenses at May meeting..	20 45
"	57	I. S. Mahan	Expenses at meeting of Executive Committee..	17 50
"	58	J. M. VanOsdel...........	Expenses at Board meeting	18 50
Aug. 24, 1867.	59	J. W. Bunn, Treasurer .	Payment of bills for advertising sales of scrip.	229 75
"	60	Journal Co., Springfield ..	Printing and blank books for Industrial University..........................	25 00
"	61	J M. Gregory	Salary for July	333 33
"	62	Sharfy & Sweet...........	Insurance on University, and stamps..	133 15
Sept. 2, 1867..	63	J. M. Gregory......... .	Payment of Laborers......	150 00
"	64	*Joseph Nash*.............	*Cartage of furniture*......................	1 50

Date.	No.	To whom.	Objects.	Amount
Sept. 9, 1867	65	Henry Swannell	Blank record for Executive Committee	38 00
Sept. 9, 1867	66	Dr J. W. Scroggs	Expense to Chicago, on University business	21 00
"	67	J. H. Pickrell	Expense committee meetings	9 65
"	68	Harris & Co	For 396 feet fencing	9 10
"	69	J. O. Cunningham	Surveying and moving fence, and expenses	62 00
"	70	O. O. Alexander	Recording deeds	2 50
Sept. 11, 1867	71	J. M. Gregory	Expense attending sale of scrip, and other expenses	72 50
"	72	G. H. Anderson, A. Ex. Co.	Charges on 6 boxes of books from Washington	61 25
Sept. 13, 1867	73	W. A. Pennell	Money advanced, for University, to Maj Powell	500 00
Sept. 18, 1867	74	Charles Kavanaugh	Cut stone for University steps	1,280 00
Sept. 20, 1867	75	M. C. Goltra	Expenses at May meeting	15 00
"	76	J S. Johnson	" "	33 75
"	77	J. M. Gregory	Payment for labor and materials for building	1,000 00
Sept. 21, 1867	78	William Smith	Cartage of stone to University	78 50
Sept. 23, 1867	79	Edwin Pierce	For lot 7, block 62, Seminary addition	560 00
Oct. 9, 1867	80	Adams, Blackman & Lyon	Seal, blanks and letter press	48 00
"	81	Chas. H. Topping	Expenses at May meeting	27 15
"	82	M C. Goltra	Locating land scrip, entry fees and expenses	1,000 00
Oct. 18, 1867	83	Thomas Quick	Expenses at Executive Committee meeting	19 30
Oct. 19, 1867	84	J. M. Gregory	Salary for August and September	666 67
"	85	Chas G Larned & Co	Stove, hardware and labor	25 40
Oct. 26, 1867	85½	J. M Gregory	Salary for October	333 33
"	86	W. H Somers	Lots 206 and 207	500 00
Oct. 31, 1867	87	Robert Peacock	Lumber and posts, on contract	633 97
"	88	J W. Bunn	Payment for advertising sale of scrip	111 00
Nov. 1, 1867	89	Smith & Kinney	Grading contract, in full	172 52
Nov. 27, 1867	90	Allen McClain	Lot	150 00
"	91	J. C. Kirkpatrick	Lot	300 00
"	92	Chas. H. Topping	Expenses at meeting	24 70
"	93	Thos. Quick	" "	19 30
"	94	L. R. McMurray	" "	27 25
"	95	J C. Burroughs	" "	12 00
"	96	Canceled		
Nov. 28, 1867	97	A. M. Brown	Expenses	25 90
Nov. 29, 1867	98	J. M. Gregory	Payment for labor and materials for University	1,000 00
Dec. 5, 1867	99	J. M. Gregory	Salary for November	333 33
"	100	J. W. Bunn	Postage, express charges and expenses on scrip	77 37
"	101	Gen. M. Brayman	Expenses	18 75
"	102	George Harding	"	21 00
"	103	I S. Mahan	"	16 50
"	104	J. O Cunningham	"	5 50
"	105	J M Healy	Surveying and leveling College grounds	42 00
"	106	Dodson & Hodges	Hardware	39 81
"	107	H. Swannell	Glass, paints, oils, etc	55 21
"	108	O B. Galusha	Expenses and stationery	63 66
Dec. 6, 1867	108*	Walker, Lapham & Co	Lumber, lime, stones, etc	629 39
"	109	W. C. Flagg	Expenses	15 60
"	110	Samuel Edwards	"	23 70
"	111	J H Pickrell	Expenses on Board and Executive committee	15 40
"	112	Pleasant Smith	Making sidewalk on contract	58 75
"	113	Hall & Frost	Doors	206 69
Dec. 10, 1867	113*	J. M. Gregory	Balance of expenses locating scrip and traveling expenses	94 23
"	114	Fuller, Finch & Fuller	Oil and white lead	58 10
Dec. 13, 1867	114*	Lemuel Allen	Expenses	23 70
Dec. 14, 1867	115	J S. Wright	Lots 105 and 106—sub-division lot No. 1, S. W qr. sec. 7, T. 19, R. 9	600 00
"	116	McKinly & Burnham, Ag'ts	Lot No. 129	300 00
Without date.	117	A. Blackburn	Expenses	11 00
Dec. 14, 1867	118	L. W. Lawrence	"	17 50
Dec. 15, 1867	119	G W. Flynn	Posters and blanks	15 60
"	120	Elisha Eldred	5000 feet fencing	75 00
Dec. 16, 1867	121	Jas. McCorkle	1 post augur	3 50
Dec. 17, 1867	122	Weeks & Bro	Drayage	7 00

Date.	No.	To whom.	Objects.	Amount
Dec. 17, 1867.	123	Walker Brothers	Surfacing lumber	$40 10
Dec. 18, 1867.	124	Chas. G. Larned	1 stone	50 00
Dec. 20, 1867.	125	Walker, Lapham & Co	Lumber, lime, etc	48 50
"	126	Elisha Eldred	9995 feet lumber at $15	149 93
"	127	T. B. Sweet	Insurance on University building, premium and policy	154 50
"	127*	Fuller, Finch & Fuller	Glass and Varnish	41 67
Dec. 21, 1867.	128	J. M. Gregory	Salary for December	333 33
Dec. 24, 1867	129	J. M. Gregory	Purchase of library	1,000 00
an. 21, 1868.	130	J. M. Gregory	Salary for January	333 33
"	131	Jones, Ellenwood & Bradley	Tools for farm and garden	112 75
"	132	J. Periam	Wagon for farm	110 00
"	133	J. Periam	Tools for farm and garden	58 05
"	134	Furst & Bradley	" " "	92 00
"	135	Edwin Hunt & Sons	" " "	81 45
"	136	W. J. Ralph	1 set harness for farm	45 00
"	137	Wm. Cox & Co	1 span mules	250 00
Feb. 1, 1868	137*	J. Bruckshaw	1 car-load of coal	17 00
Feb. 2, 1868	138	C. F. Speery	Lot No. 173	500 00
Feb. 4, 1868	139	S. Richner	Balance on labor	299 50
Feb. 5, 1868	140	Hubbard, Herrick & Co	Hardware—locks	36 29
Feb. 6, 1868	141	Porter, Thayer & Co	26 dozen chairs, for chapel	237 00
Feb. 8, 1868	142	American Express Co	Charges on boxes of books	17 25
"	143	Ill. Cen. R. R. Co	Advanced charges on books	13 55
Feb. 17, 1868.	144	Union County Mining Co	1 car-load of coal	15 50
"	145	J. P. Hungate	Expense at May meeting	26 50
Feb. 20, 1868.	146	Hollister & Phelps	Carpet	128 50
"	147	Allen & Mackey	111 yards cocoa matting	83 25
Feb. 22, 1868.	148	Jno. Periam	1 lumber wagon	75 00
"	149	J. M. Gregory	Salary for February	333 34
Feb. 29, 1868	150	A. J. Gilliland	261 posts	26 10
March 4, 1868	151	L. Vandeyde	Straw mats	8 20
"	152	Palmer, Fuller & Co	Glass, putty and sash, for garden	61 10
March 7, 1868	153	Ill. Cen. R. R. Co	Back charges on freight	45 55

REGENT'S ACCOUNT OF WARRANTS.

Whole amount of warrants drawn		$35,076 90
Amount paid out by Treasurer	$34,713 70	
Check No. 16, not paid	20 45	
Check No. 34, "	200 00	
Check No. 58, "	19 50	
Check No. 105, "	43 00	
Check No. 145, "	26 50	
Check No. 151, "	8 20	
Check No. 153, "	45 55	
	$35,076 90	$35,076 90

CLASSIFIED STATEMENT OF EXPENDITURES.

Expense of Board and Committee meetings	$1,491 91
Paid for salaries	8,666 66
For purchases of additional grounds, and improvements in buildings and grounds	22,098 82
Expended for furniture, fuel and other current expenses	1,811 97
Expenses of sale and location of Land Scrip	2,951 80
Paid for library	1,146 33
Paid for cabinets	500 00
Expense of the Farm and Garden	889 85
Unexpended balance of warrant No. 98	496 55
Total	$35,076 90

*Numbers repeated by mistake.

Mr. SCROGGS moved, that, owing to the uncertainty of the continuance of the Inauguration exercises, which are to take place, to-day, when the Board take a recess, it shall be to meet at the call of the Chairman, this P. M.; which was agreed to.

The Committee on Inauguration reported their printed programme; which was approved.

[See Programme of Inaugural Exercises in Cor. Sec. Report.—*Rec. Sec.*]

On motion of Mr. PICKRELL, the consideration of the subjects recommended in the Regent's report was deferred until this evening.

The Board then voted to take a recess—the time having arrived for the commencement of the Inaugural exercises.

The Board of Trustees was called together again, by the Regent, at five P. M.

MAJOR POWELL'S REPORT.

Maj. Powell, of Normal, was present, and, at the request of the Board, gave an interesting account of his "Rocky Mountain Expedition"—stating, also, that the collections made for this Institution were being classified and prepared for presentation to the Board, and would soon be ready. He also stated a plan for another expedition, during the coming season, and made a proposition to furnish the Board a collection of birds, etc., from those to be gathered during his projected tour.

On motion of Mr. BURCHARD, the proposition of Maj. Powell was referred to the Committee on Library and Cabinets.

MR. DUNLAP'S RESOLUTIONS ON SCHOLARSHIPS AND EXAMINATIONS.

Mr. DUNLAP read the following resolution; which, upon his motion, was referred to the Committee on Library and Cabinets:

Resolved, That the Regent report to this Board the names of all honorary students, the name of the county from whence they came, the name of the father of each student, and the number of the Regiment or Corps in which he served, in the army or navy of the United States, during the late rebellion.

Also, the names of all other students, the counties from whence they came, stating whether they were examined by the County Board of Examiners or by others.

If by the County Board, the per centage of correct answers given, as reported by said Boards.

If examined by other parties, the mode of examination, and the per centage of correct answers given by each.

Mr. Dunlap also read the following, moving its reference to same committee; which was agreed to—viz:

Resolved, That hereafter and until otherwise ordered the Superintendent in each county shall select two assistants, one of whom shall be an operating agriculturist, and the other an operating mechanic; that these shall constitute a board of examiners to examine all applicants for scholarships in the Illinois Industrial University, whether honorary or otherwise: *Provided*, that they shall examine no applicant unless such applicant is a resident of said county.

In case of the applications of the descendants of soldiers and seamen who served in the army or navy of the United States during the late rebellion (preference being given to the children of such soldiers or seamen as are diseased or disabled) for admission to said University, the said Board shall issue to the applicant, who shall be decided to have attained the greatest proficiency in those branches of learning usually taught in the common schools, a certificate setting forth such fact; and also in said certificate to give the name of the father of said applicant, and the Regiment or Corps in which he served during the said rebellion.

That the said applicant is not less than fifteen years of age, and of good moral character. That said certificate shall entitle the holder to receive, without charge for tuition, instruction in any or all the departments of the University, for a term of three consecutive years, as provided by section 9 of the act of incorporation.

That in case of a vacancy in said scholarship, the Regent shall direct the Corresponding Secretary to notify the Superintendent of Public Instruction in said county where the vacancy occurs of said fact, and it shall be the duty of said Superintendent to give public notice, at least twenty days, of such vacancy, and of the time and place where a public examination will be held for the filling of the same.

That said Board shall, from time to time, hold public examinations of all applicants for scholarships in said University, and shall give a certificate to each applicant who shall undergo a satisfactory examination in each of the branches ordinarily taught in the common schools of the State. They shall certify that said applicant is a resident of said county, not more than fifteen years of age, and of a good moral character. That all applicants holding such certificates shall be admitted to any or all departments of the University: *Provided*, that the Board of Trustees shall have made arrangements for their accomodation. That in case of an excess of students, the Regent shall direct the Recording Secretary to call a special meeting of the Executive Committee, who shall take such action as the case demands.

REGENT'S REPORT REFERRED TO COMMITTEES.

Mr. Burchard moved that so much of the Regent's report as relates to warrants, be referred to the Auditing Committee; which was agreed to.

Also, on motion of Mr. Burchard, so much of the report as relates to estimates of expenditures was referred to the Finance Committee.

Mr. Blackburn moved that so much of this report as relates to the Faculty and courses of study of this Institution, be referred to the Commitiee on Faculty and Courses of Study; which was done.

COMMITTEE ON SALARIES.

Mr. Burchard moved that the subjects of the salaries of the Secretaries and Treasurer, for the past year, be referred to a committee of three; which was agreed to, and

Messrs. Burchard, Blackburn, and Allen were appointed said committee.

REPORT OF HORTICULTURAL COMMITTEE.

Mr. Pullen, Chairman of Committee on Horticultural Department, reported as follows:

The Committee on Horticultural Department would respectfully submit that, owing to the fact that no one has, as yet, been chosen to occupy the position of Professor of Horticulture in the Institution, no permanent plans could be matured for the development of this department. Also, that the season has not arrived for the carrying out of the plans *already* adopted in this department, which plans, we judge, embrace sufficient work for the coming season.

(Signed) B. PULLEN,
O. B. GALUSHA.
Committee.

The following resolution, presented by Mr. Dunlap, was adopted:

Resolved, That the Committee on Library and Cabinets be directed to procure the necessary cases for the State Entomologist, in which to place the collection of insects that he is to provide for the University, and that a warrant be drawn for the payment of the same, when procured.

REPORT OF COMMITTEE ON LIBRARY AND CABINETS.

The Committee on Library and Cabinets presented their report through Mr. Burroughs, its Chairman, as follows:

The Committee on Library and Cabinets ask leave to report:

Under the instructions of the Board at its last meeting, that the Committee should proceed to purchase the cabinet of Prof. Bromby, in amount not to exceed $6,000, the Committee met immediately after the adjournment of the Board and instructed the Chairman to contract with Messrs. Iglehart & Co., of Chicago, who had control of the cabinet, for the purchase, on *two conditions*:

First.—That the cabinet should be opened to full and free inspection by the Committee or some competent person acting for them, and should be approved by the

Committee as answering fully to the catalogues and accompanying descriptions, before final purchase.

Secondly.—If the $8,000 demanded by Messrs. Bangs & Merwin, of New York, should be advanced, a bond should be taken for the refunding of the money in case the cabinet should be found not to answer the descriptions, with such securities as should be approved by the Trustees resident in Chicago.

Under these instructions the Chairman of the Committee proceeded to make a contract with Messrs. Iglehart & Co., as follows. (Mr. B. here read the contract.—Sec.)

To the contract an agreement was afterward added, that $2,000 of the amount proposed to be paid should not be payable until the first of next May.

As it was found that the Regent of the University was to visit New York about the first of January, and could make the required examination in person, it was arranged with Messrs. Iglehart & Co., that the time for the examination should be extended till after that date.

During the month of January the Regent, associating with himself Mr. Hall, of New York, and Prof. P. H. McChesney, of the University of Chicago, made an examination at least of enough of it to judge of its general character, and of the manner in which it had been packed and preserved.

It will be understood by the Trustees that the value of collections in Natural History depends quite as much on the proper classification, labeling and preservation of the specimens, as on their original character; and it will be remembered that the proprietors of this collection, in the description which accompanied the catalogue, took pains to guarantee that the specimens had been carefully packed, and would be found uninjured by transportation, and in every respect in the best condition.

Much to the disappointment of the Regent, the examination of the first box which was opened gave evidence of extreme carelessness in packing.

The specimens, instead of being wrapped in cotton, as the description of Major Vail had represented, were found with a single wrapping of newspaper, and consequently many of them almost totally ruined in transportation, fine groups of crystals being literally crushed, and others seriously defaced and broken.

Other boxes showed the same conditions, and after thus examining three or four boxes the Regent, and the scientific gentlemen who accompanied him, agreed in the opinion that it was useless to pursue the examination, since the cabinet, as found in the boxes, could in no sense be claimed or accepted as that called for by the contract with the proprietors.

Notice to this effect was accordingly served on Messrs. Iglehart & Co., and that the contract with them was held to be void.

The fortune of the negotiation leaves the University without other means for the illustration of any department of Natural History than what is to accrue from the expedition of Major Powell. The results of that expedition have not yet been reported to this Committee.

The Committee have examined with interest the proposition of Dr. George Vasey, which was referred to them by the Trustees, and would earnestly recommend its acceptance, as by far the cheapest and best means within reach for acquiring a reliable collection of the flora of the State.

THE LIBRARY.

With the appropriation of $1,000 made by the Board at its last meeting, the Committee, through Dr. Gregory, purchased in New York, during the winter, 644 volumes, the titles of which are herewith submitted. This beginning of a library is distributed among different subjects, about as follows:

Modern History and Biography, 180 volumes.

Ancient History, 30 volumes.

Science, 113 volumes.

Including a fine set of the Natural History of New York in 29 volumes, purchased at a low price.

Philosophy, etc., 60 volumes.

Poetry, 14 volumes.

Works on English Literature, 10 volumes.

Historical Romances, 20 volumes.

Travels and Geography, 10 volumes.

Three Encyclopedias, the principal of which is Appleton's New American Encyclopedia, in 21 volumes.

Miscellany, 178 volumes, including a good set of the London Quarterly, from the beginning, costing only $53 50.

In addition to these purchases, donations of 283 volumes of valuable public documents have been received from the United States Government, and also 116 volumes from private sources, a catalogue of which the Committee have not yet been able to see.

The attention of the Board is called to the necessity of the appointment, at this meeting, of some suitable person to act as Librarian.

[Signed] J. C. BURROUGHS,
I. S. MAHAN,
W. C. FLAGG.

This report was adopted by vote of the Board.

THIS VOTE RE-CONSIDERED.

Mr. Burchard moved that the vote by which the report of Committee on Library and Cabinets was adopted, be re-considered; which was agreed to.

Mr. Burchard then moved to adopt all this report except that relating to the proposition of Dr. Vasey; which was done.

He also moved to postpone the consideration of Dr. Vasey's paper until the next meeting of this Board. Carried.

The Regent read a letter from Samuel Edwards, member of the Board. Also, a communication from Hon. Mr. Lawrence.

COMMITTEE ON NOMINATIONS.

Mr. Cunningham moved that a committee of three be appointed to nominate the officers who are to be elected at this meeting.

The motion prevailed, and Messrs. CUNNINGHAM, HARDING and BURCHARD were appointed said committee.

On motion of Mr. HAYES, it was

Resolved, That the Regent be required to make an actual test of all the oil to be used in this building, and that none be used which is less than one hundred and ten degrees, fire test.

At seven o'clock the Board took a recess until eight.

EVENING SESSION.

Board re-assembled at eight o'clock, REGENT in the chair.

On motion of Mr. QUICK, the Corresponding Secretary was instructed to embrace in his annual report an account of the Inauguration ceremonies.

REPORT OF COMMITTEE ON LIBRARY AND CABINETS.

Mr. BURROUGHS, Chairman of Committee on Library and Cabinets, made a special report, as follows:

1st. The committee recommend that the subject of further appropriation to the exploring expedition of Major Powell, be referred to the Committee on Library and Cabinets, with power.

2d. That the initiation fees of students, for the present term, be appropriated to supply the immediate wants of the library.

The report was adopted.

CHANGE OF SEAL OF THE UNIVERSITY.

Mr. FLAGG moved that the words "Farmers and Mechanics" be stricken out from the outer circle of the seal of the Board; which was so voted.

Mr. HAYES moved that the seal be so amended that the words "Illinois Industrial University" be put into the outer circle *above*, with the inscription "Chartered in 1867," placed in the outer circle *below*; which was agreed to.

Mr. McMURRAY moved that the motto upon the seal be changed from the words "Onward and Upward," to the words "Learning and Labor." This motion prevailed.

The Board voted to instruct the Treasurer to have a new seal prepared, in accordance with the plan just adopted.

Mr. FLAGG moved that the present seal continue to be the seal of the University until the new one is prepared. Carried.

IMPROVEMENTS TO COLLEGE BUILDING.

Mr. GOLTRA, Chairman of Committee on Buildings and Grounds, reported the following:

Your Committee on Buildings and Grounds, to whom was referred that part of the Regent's report relating to front portico, beg leave to report, that they recommend that the Regent cause the portico to be finished in accordance with the design furnished by J. M. VanOsdel, and adopted at a former meeting of the Board.

They also recommend that approved jacks be placed on all the chimneys of the rear extension of the College building; also, that the roof of the said rear extension be covered in the best manner with the best quality of roofing tin.

They also recommend that a sufficient number of lamps be obtained and arranged in the halls and passages of the College building, to properly light the halls, passages and stairways, when required.

We also recommend that a bell be placed in the cupola, suitable for the use of the Institution.

The expense of such improvements, exclusive of portico and bell, will be about $800.

Respectfully submitted,

(Signed) M. C. GOLTRA.

The report was adopted.

On motion of Mr. JOHNSON, the REGENT was instructed to purchase a suitable eight-day clock for the use of the University.

ELECTION OF PROFESSORS.

The REGENT called Mr. MAHAN to the Chair, and, as Chairman of the Committee on Faculty and Courses of Study, reported verbally, presenting the name of Willard F. Bliss, of Nokomis, Ill., as a suitable person to fill the Chair of Professor of Agriculture—moving the passage of the following resolution:

Resolved, That Willard F. Bliss be and he hereby is elected for one year to the Chair of Professor of Agriculture, his term of office to commence with the fall term of this Institution, at a salary of $2000 per annum.

Mr. BLISS was unanimously elected.

The REGENT yielded the floor temporarily to Mr. BURCHARD, Chairman of the Committee on Salaries of Secretaries and Treasurer, who reported as follows:

SALARIES OF SECRETARIES AND TREASURER.

The Special Committee, to whom was referred the matter of compensation for the services of Secretaries and Treasurer of the Board, recommend that, for services to this date, there be allowed

To the Treasurer, the sum of	$600 00
To the Recording Secretary	325 00
To the Corresponding Secretary	100 00
To Mr Scroggs, as Secretary of the Executive Committee	15 00

And that warrants be drawn in their favor for the several amounts.

(Signed) H. C. BURCHARD.

The report was adopted.

REGENTS REPORT RESUMED.

The REGENT then offered the following resolution:

Resolved, That John A. Warder, of Cincinnati, be and hereby is appointed as Lecturer upon the subject of Pomology. His term of service to commence with the college year in September next.

Dr. Warder was elected unanimously.

By a similar resolution, Mr. Edward Eggleston, of Evanston, was elected unanimously as Lecturer on English Literature. His term of service to commence with the College year.

Professor John W. Powell, of Normal, Ill., was also unanimously elected to the Professorship of Natural History, his term of service to commence at such time as may be agreed upon between himself and the Committee on Faculty and Courses of Study.

REGENT offered the following recommendations, viz:

Prof. J. B. Turner, of Jacksonville, Ill., as Lecturer upon such subjects connected with Agriculture as he may select. Also, Dr. J. A. Sewall, of Normal, Ill., as Professor of Chemistry, and S. A. Peabody, of Chicago, as Profesor of Mechanical Science and Engineering.

The names of Prof. Turner, Sewall and Peabody were referred back to the committee, with power to act.

REPORT OF AUDITING COMMITTEE.

The Auditing Committee, to whom was referred the report and accounts of the Treasurer and Regent; also, certain unpaid bills and accounts, respectfully represent that they have examined the books of the Treasurer and the accounts of warrants paid by him, and find that he has paid the warrants drawn by the Regent and Recording Secretary, to the amount of $84,713 70, being warrants from No. 1 to No. 153, inclusive, except warrants Nos. 16, 34, 58, 105, 145, 151 and 153, which

have been issued, but have not been, as yet presented, amounting to $363 20; which, added to the amount of the warrants paid by him, makes a total of $35,076 90, and agrees with the detailed statement of warrants issued and submitted to the Board by the Regent.

The Committee further report, that they have examined the list of warrants issued by the Regent since the last meeting of the Board, and find the same to have been authorized by the Board for the objects specified, and that the accounts of the Regent are correct.

There has been expended of the $1500 drawn by the Regent, pursuant to the order of the Board, with warrant No. 98, the sum of $1073 45, as per vouchers and detailed statement furnished by the Regent, leaving a balance in his hands of $426 55; which will be needed for general incidental expenses and liabilities already incurred.

Your Committee further report, that they have examined, and recommend the allowance of the following bills and accounts against the University, submitted to them, and that warrants be issued on the Treasurer for the several amounts of the same.

J. M. Gregory, for balance of expenses in procuring the Library	$18 67
M. C. Goltra, for services in locating scrip	200 00
J. O. Larned & Co., furniture	68 60
Robert Peacock, lumber	126 84
Bradler & Brother	182 73
Porter, Thayer & Co	136 00
Walker, Lepman & Co	23 44
Joseph McCorkle	29 21
Dopan & Hodges	79 29
George K. Hosford	6 85
Flynn & Scroggs	48 50
Walker & Bro's	218 32
Prairie Farmer Co	107 25
J. C. Cunningham, insurance and incidentals	177 00

(Signed) H. C. BURCHARD,
O. B. GALUSHA.

The report was adopted.

The Regent stated that Prof. Atherton's term of service commenced with the month of February last, and that there was no provision, as yet, for his payment for said month, whereupon;

Mr. Hayes moved that the Regent be authorized to draw a warrant on the Treasurer, in favor of Prof. Atherton, for the month of February last.

Which was agreed to.

ANNUAL REPORT OF FINANCE COMMITTEE.

Mr. Cobb, Chairman of the Finance Committee, presented his *annual report*, as follows, viz :

To the Board of Trustees of the Illinois Industrial University:

GENTLEMEN—The Finance Committee, in accordance with our by-laws, would submit the following report:

At our November meeting we gave a detailed statement of the expenses up to that time, which appears fully in the published proceedings of that meeting.

In making up our exhibit for the past year, we give the gross expenditures according to the November statement $25,622 35
Warrants drawn since that time.................................... 9,454 55

Making the total of expenditures.............................. ....$35,076 90

The Treasurer's report shows the receipts, as follows:

Sale of Champaign county Bonds, as per order of the Board	$40,000 00
Interest on Illinois Bonds......................................	3,750 00
Rents of farm	1,500 00
	$45,250 00

Making the balance in Treasurer's hands $10,173 10.

LAND SCRIP.

Prior to our November meeting we had disposed of 280,000 acres of scrip, realizing therefor $162,192 41.

At our November meeting we made a further sale of 100,000 acres, at 90 cents, or for $90,000. Making the total amount received for land scrip $250,192 41.

The Treasurer, according to the terms of the last sale, does not get the total proceeds until about the first of May, there being about $50,000 back at the present time.

Your Committee, in conjunction with the Treasurer, have deemed it wise to put the proceeds of the land scrip in Illinois bonds, as fast as they could be obtained, at par and interest, thereby having our funds in such form that we could, from time to time, re-invest in securities bearing a larger rate of interest, when good and safe investments of that kind presented themselves.

We hope to put the most of the fund in such securities in a very short time.

By referring to the minutes of the November meeting you will also see that under various resolutions, this Committee had located 25,000 acres of land scrip. We passed a resolution at that meeting to locate 25,000 additional acres. This has not been done as yet. We would ask further instructions in regard to this.

We now have on hand 50,000 acres of scrip unprovided for by entry or sale.

ESTIMATES FOR THE COMING YEAR.

Receipts :

Interest on Champaign County Bonds..........................	$10,000 00
Interest on Land Scrip Fund	10,500 00
Tuition and Matriculation fees, Spring Term....................	1,200 00
Tuition and Matriculation fees, Fall Term	1,500 00
Balance on hand, as per Treasurer's report	10,173 10
	$33,373 10

—11

Expenses:

Salaries of Regent, Professors, Head Farmer, Lecturers, etc.....	$17,600 00
For farm..	1,500 00
Board meetings..	1,000 00
Use of Corresponding Secretary..	500 00
Library..	2,700 00
Unpaid bills..	1,500 00
Portico, roof, bell, etc..	950 00
Landscape gardening..	500 00
Salaries unpaid—Secretary, etc..	1,045 00
Other salaries and incidentals, which cannot be enumerated or foreseen..	1,000 00
	$28,295 00

Recapitulation:

Receipts..	$33,373 10
Expenses..	28,295 00
Leaving a balance of..	$5,078 10

It would seem prudent by your Committee, that said sum should remain in the hands of the Treasurer, subject to the order of this Board, or of the Executive Committee, to meet demands that it is now quite impossible for us to anticipate.

We feel that under the present economical administration of our affairs, as evinced and insisted upon by one and all, that we shall not have to further disturb our Champaign County Bonds, and that by pursuing this course we shall be able to go to our next Legislature and confidently ask sufficient aid to construct our necessary farm buildings.

All of which is respectfully submitted.

[Signed]

EMORY COBB,
J. O. CUNNINGHAM,
GEORGE HARDING,
O. B. GALUSHA.

Mr. BLACKBURN moved to so amend the report that the unexpended balance of funds shall be invested by the Finance Committee. Carried.

ORDER FOR WARRANTS.

Mr. BURCHARD moved that the REGENT be instructed to draw warrants on the Treasurer, in favor of the several persons, for the several amounts due to them, as reported by the Auditing Committee. The motion prevailed.

Mr. BURROUGHS presented the following resolution, moving its adoption, viz:

Resolved, That the Finance Committee be instructed to employ a competent accountant, and to see that a set of books is opened in double entry, including distinct accounts of the leading sources of income and expenditure; and the said accountant to present a proper balance sheet at each meeting of the Board, and the books to be at all times open to the inspection of the Trustees of the University. And the said accountant also to be subject to the call of the Regent for any clerical services he (the Regent) may find necessary.

Mr. BLACKBURN offered the following as a substitute for the resolution of Mr. BURROUGHS:

Resolved, That the Regent be authorized to employ such clerical aid as he may need, to keep the accounts of this Board and the University.

This resolution was adopted.

REPORT OF COMMITTEE ON NOMINATIONS.

Mr. CUNNINGHAM, Chairman of the Committee on Nominations, reported as follows:

For Recording Secretary.—Jonathan Periam.

Executive Committee.—Messrs. Hayes, Pullen, Harding, Goltra, Cobb, VanOsdel, Mahan and Quick.

Auditing Committee.—Messrs. Lawrence, Edwards, Galusha, Burchard and A. M. Brown.

Finance Committee.—Messrs. Cobb, Pickrell, Cunningham, Burchard and Harding.

Faculty and Course of Study.—Messrs. the Regent, Brayman, Hayes, Flagg and Bateman.

Buildings and Grounds.—Messrs, Goltra, Cunningham, VanOsdel, Johnson and McConnell.

Agricultural Department.—Messrs. Quick, Pickrell, Allen, Blackburn and McMurray.

Horticultural Department.—Messrs. Pullen, Dunlap, Flagg and Galusha.

Mechanical Department.—Messrs. Scroggs, Goltra, Brown of Chicago, and VanOsdel.

Military Department.—Messrs. Brayman, Quick, Lawrence and Dunlap.

Library and Cabinets.—The Regent, W. C. Flagg, N. Bateman, A. M. Brown, J. S. Johnson.

By-Laws.—Mahan, Blackburn and A. M. Brown.

Mr. HAYES was, at his request, excused from nomination as a member of the Executive Committee, and Mr. CUNNINGHAM was substituted.

Mr. BURROUGHS was also excused, at his own request, from nomination on the Committee on Library and Cabinets, and the REGENT substituted.

Thus altered, the *report was adopted.*

Mr. BURCHARD moved that the bill of Mr. T. P. Bonfield, for services as Attorney for the Board, be allowed, and the Regent instructed to draw a warrant on the Treasurer for the same, to the amount of $100.

It was so ordered.

Mr. BURCHARD moved that the following bills be allowed, and warrants drawn for their payment, viz:

C. Scribner & Co., for maps	$135 65
M. S. Hall & Co	56 62

Which was agreed to.

IMPROVEMENTS ON COLLEGE BUILDING.

Mr. BURROUGHS offered the following resolution; which was adopted:

Resolved, That the Committee on Buildings and Grounds be instructed to immediately examine the condition of this building, with special reference to its safety on occasions when large numbers of people are collected in it; and also to devise and carry out, within the shortest possible time, such means of egress from the Chapel and other public rooms, as would allow the more expeditious exit of large audiences, in case of fire or other alarms.

TESTIMONIAL TO THE REGENT.

Mr. HAYES offered the following resolution, asking for the yeas and nays upon it:

Resolved, That this Board of Trustees have undiminished confidence in the integrity, ability and fitness of the Regent, and pledge him a firm support in the performance of his duties.

The vote was unanimous—all the members present voting yea, as follows: Messrs. Allen, Blackburn, Brayman, Burchard, Burroughs, Cobb, Cunningham, Dunlap, Flagg, Galusha, Goltra, Harding, Hayes, Johnson, Mahan, McMurray, Pickrell, Pullen, Quick, Scroggs and VanOsdel.

Mr. BLACKBURN moved that the terms of admission to this Institution be so amended, that no fees for matriculation or for incidentals, shall be demanded, and the room rent be reduced one half.

On motion of Mr. BURCHARD, this subject was referred to the Executive Committee.

THE GRIGGS FARM.

Mr. Cobb moved the adoption of the following resolution:

Resolved, That J. O. Cunningham be authorized to sell the Griggs farm, or any portion thereof, at not less than sixty dollars per acre. Terms: Twenty per cent. down, and balance on ten years' time, at eight per cent. interest, payable annually.

The yeas and nays being called on this resolution, were taken, resulting as follows:

Members voting yea, were: Messrs. Burchard, Cobb, Dunlap, Galusha, McMurray, Pickrell, Quick and Scroggs—8.

Members voting nay, were: Messrs. Allen, Blackburn, Brayman, Burroughs, Cunningham, Flagg, Goltra, Harding, Hayes, Johnson, Mahan, Pullen, VanOsdel and the Regent—14.

The resolution was declared lost.

FREE TUITION TO INDIGENT STUDENTS.

On motion of Mr. Cunningham, it was voted that indigent students be admitted free, at the discretion of the Faculty.

SCHOOL HOUSE SITE DONATED.

Mr. Blackburn moved that the petition for a school house site upon the Busey farm, as per report of the Committee on Agricultural Department, be granted, and the acre of ground asked for be leased, rent free, for school purposes only, upon condition that a good fence is kept up around said lot.

Carried unanimously.

RESOLUTIONS OF THANKS.

The thanks of the Board were unanimously tendered to Prof. George F. Root, and all who assisted him, for the most excellent music rendered at the Inauguration exercises; also, to the ladies and citizens of the two cities of Urbana and Champaign and their vicinities, for the sumptuous collation provided to-day for this Board and its guests.

On motion of Mr. Cunningham, the thanks of the Board were unanimously tendered to the Recording Secretary, for the able manner in which he has discharged the duties of his office during the year.

ORDER FOR PUBLISHING MINUTES.

On motion of Mr. PICKRELL, it was ordered that the Corresponding Secretary publish the minutes of this meeting in his first Annual Report.

ADJOURNMENT.

On motion of Mr. GOLTRA, the Board adjourned at two o'clock A. M., of March 12th, to meet at the call of the Regent.

O. B. GALUSHA,
Recording Secretary.

MINUTES OF MEETINGS OF EXECUTIVE COMMITTEE,

DURING 1867.

DOANE HOUSE, CHAMPAIGN, ILLINOIS, *May 9th*, 1867.

Pursuant to announcement, the Executive Committee of the Illinois Industrial University met at the Doane House, in Champaign, Illinois, May 9th, 1867.

Present—John M. Gregory, J. O. Cunningham, J. W. Scroggs, J. M. VanOsdel, and T. Quick.

JOHN M. GREGORY was elected Chairman, and J. W. SCROGGS, Secretary.

On motion, J. W. Scroggs, and J. O. Cunningham were appointed a Committee on grading the ground around the University building, with power to make contracts for necessary work in said grading.

On motion, John M. Gregory, the Regent, was authorized to obtain plans for the improvements of the University building, erection of front steps, etc.; also, to make contracts for material and work on said Industrial University for front entrance on the north, and such other improvements as the Executive Committee may deem necessary.

On motion,

Resolved, That J. W. Scroggs and J. O. Cunningham, be a Committee to obtain a survey and to have the grounds staked and otherwise prepared for the grading, by some good and competent engineer.

Also, resolvad, That the Regent, John M. Gregory, be authorized to obtain the necessary amount of stationery for the University.

On motion, the Committee adjourned.

JOHN M. GREGORY,
Chairman Executive Committee.

J. W. SCROGGS, *Secretary Executive Committee.*

June 14, 1867.

Pursuant to the call of the Regent, the Executive Committee of Illinois Industrial University met at nine o'clock, A. M., in the University building.

Present—John M. Gregory, J. M. VanOsdel, M. L. Dunlap, J. O. Cunningham, I. S. Mahan, Emery Cobb, J. H. Pickrell, and J. W. Scroggs.

The REGENT assumed the chair and called the members to order, after which he presented an order of business.

On motion, J. W. SCROGGS was elected permanent Secretary of the Executive Committee.

On motion of J. O. CUNNINGHAM, a committee from the county Board of Supervisors, consisting of A. B. Condit, S. K. Koogler and Mr. Morgan, were invited to communicate with the Executive Committee, in relation to the business pertaining to the proposed purchase of certain lots from the county.

On motion,

Resolved, That J. W. Scroggs be a Committee to obtain the refusal, in writing, for lots 4 and 7, in block 52, in the town plat of Urbana, from the parties to whom they belong.

J. O. CUNNINGHAM offered the following resolutions, which, on motion, were adopted.

Resolved, That it is desirable that the University enlarge its grounds by the purchase, or otherwise, of all the lots in blocks 52 and 53, and of lots 5, 6, 4 and 7 in blocks 41, 42, 51, and 57.

Resolved, That it is the opinion of this Committee that Champaign county should make good its offer to the State, by conveying sufficient ground contiguous to the University, to make up the size of the ground to ten acres.

By motion of the Committee, an order was drawn on the Treasurer, in favor of the Recorder of Champaign county, for $18 85 to pay for recording eight deeds, $7 75, ten patents, $7 50, and four copies of patents, $3 60.

On motion of M. L. DUNLAP, an order was drawn on the Treasurer for $61 25, for the purpose of paying express charges upon books from Washington, D. C.

A resolution was passed instructing the Regent to draw orders for the payment of expenses of the Trustees for the May meeting, when their bills should be received and approved by the Auditing Committee.

A resolution was passed, on motion of J. W. SCROGGS, appointing Messrs. Cobb, Pickrell and VanOsdel a Committee to arrange with the Illinois Central Railroad Company a commutation of freight for passengers' fare, for benefit of members of the Board of Trustees and the different Committees attending to the business of the University; and that the Committee be further instructed to obtain passes for the members of the Board from such other roads as they may deem necessary.

On motion of M. L. DUNLAP, J. W. Scroggs, and J. M. VanOsdel, together with the Regent, were appointed a Committee on lumber and material for building purposes, with power to purchase by the cargo, or otherwise, provided they do not purchase to exceed 150,000 feet of lumber; also, to purchase such number of posts as may be necessary for the use of the grounds and lands.

On motion of J. H. PICKRELL, it was

Resolved, That a competent survey of the 160 acres of land lying *adjacent* to the University building be made before any fences are built on said land, and that the Regent be authorized and requested to employ a surveyor to make the survey and to establish permanent corners.

On motion of M. L. DUNLAP,

Resolved, That the Regent, Treasurer, and Chairman of the Finance Committee be authorized to sell, at their discretion, 100,000 acres of the land scrip: *Provided*, that said scrip shall not be sold for less than 56 cents per acre: *And, provided, further*, that the consent of a majority of the Trustees be first had, in writing, to such sale.

After the adoption of the above, the following members gave their consent, in writing, to the proposed sale of scrip: M. L. Dunlap, Emory Cobb, J. W. Scroggs, J. H. Pickrell, J. M. VanOsdel, J. O. Cunningham, I. S. Mahan, and John M. Gregory.

A copy of said agreement is on file with the Secretary of the Executive Committee.

On motion of J. W. SCROGGS, a Committee was appointed to confer with a committee from the County Board of Supervisors, said Committee to consist of Messrs. Cobb, Pickrell, and Cunningham.

On motion, adjourned till 2 o'clock, P. M.

AFTERNOON SESSION—JUNE 14, 1867.

The Committee met at 2 o'clock, P. M., pursuant to adjournment.

REGENT in the chair.

Mr. QUICK, a member of the Executive Committee arrived and took a seat with the others.

Mr. VANOSDEL, from the Finance Committee, reported bill of Mr. W. Strong, for furniture, for $464, and recommended its payment, and that an order be drawn on the Treasurer.

Report was adopted, and the order drawn.

On motion of Mr. COBB,

Resolved, That the bill for advertising and other expenses incurred in selling land scrip be sent to the proper State officers for payment, and that a committee, composed of the Regent, the Treasurer, and Gen. Brayman, be appointed, with power to act in the premises.

Resolved, That in the event of delay in the payment of the above bill by the State, that the Regent draw an order for the amount just paid, and that it be collected from the State, as provided by the act of Congress making grant of land for college purposes.

Adopted.

On motion, the bill of the REGENT for stationery and postage, was allowed, and ordered paid. Amount $26.

Mr COBB moved that the contract for grading the grounds be approved, and that the Regent be authorized to draw an order for payment of said work, in accordance with said contract. Adopted.

Mr. CUNNINGHAM offered a resolution to the effect that the Regent be authorized to make all necessary contracts for carrying out all improvements ordered by the Board of Trustees or Executive Committee. Carried.

Mr. COBB moved that J. O. Cunningham be appointed a committee to ask the city of Urbana to vacate the alleys and streets, or so much of them as divide the University grounds, running east and west through blocks 52 and 53, viz: Stoughton and ——— streets. Carried.

Mr. VANOSDEL offered the following:

Resolved, That Dr. Scroggs and the Regent be Committee to purchase the two lots, 4 and 7, in block 52, on the best terms they can obtain from the parties owning them, and that the Regent draw the necessary order on the Treasurer for the payment of the same.

Adopted.

Mr. CUNNINGHAM offered the following; which was adopted:

Resolved, That sidewalks eight feet wide, made of two-inch pine plank, properly supported, be constructed in front of the University building, and also on the streets east and west of the building, as far south as the street intercepted by the University ground; also, such walks in the grounds as the Regent may deem necessary.

REPORT OF SUPERVISORS OF CHAMPAIGN COUNTY.

The Committee of the Board of Supervisors hereby present their report, in response to the resolution of the Executive Committee of the Illinois Industrial University.

Said Committee of Board of Supervisors do, by the powers conferred upon them, donate to the Illinois Industrial University, in block 53, belonging to Champaign county, all of lots 6, 5, 4, 3, 2, 7, 8, 9, 10 and 11, in consideration of which it is understood that in the conveyance of said lots to said University, the deeds shall be drawn in such form that in case said University should be, by any event, removed from its present location, said lots above designated shall revert to Champaign county.

The Committee of the board of Supervisors, hereby agree to sell to the Illinois Industrial University, the following lots, at the prices marked in the list below, as follows, to-wit:

Lot 1,	Block 52	$500 00	
" 2	"	52	450 00	
" 3	"	52	450 00	
" 4	"	52	450 00	
" 5	"	52	450 00	
" 6	"	52	500 00	
				$2,550 00
" 8	"	52	400 00	
" 9	"	52	400 00	
" 10	"	52	400 00	
" 11	"	52	400 00	
" 12	"	52	450 00	
				$2,050 00
" 1	"	53	$350 00	
" 2	"	53	350 00	
				$700 00
				$5,100 00

And they further consent to the wish of the Committee from the Executive Committee of the Illinois Industrial University, and give the University, in its corporate capacity, the refusal of the tier of lots east of the building (at the market price) until the next meeting of the Board of Supervisors, which takes place on Friday, Aug. 23, 1867.

Said lots, on the east side of the building, are numbered and marked as follows, to-wit:

Lot 6,	Block	41	$500 00
" 7	"	41	450 00
" 5	"	42	500 00
" 4	"	42	450 00

Lot 6,	Block	42	500 00
" 7	"	42	450 00
" 4	"	51	450 00
" 5	"	51	500 00
" 6	"	51	450 00
" 7	"	51	400 00
			$4,650 00

(Signed) SAMUEL KOOGLER,
A. B. CONDIT,
WOODSON MORGAN,
Committee.

On motion of Mr. VanOsdel, the report of the Committee from the Board of Supervisors was accepted.

Mr. Mahan offered the following:

Resolved, That the action of the Board of Supervisors of Champaign county, in donating valuable city lots to the University, to enlarge the grounds surrounding the University building, making up the amount to ten acres, entitles that Board and the people of the county, to the gratitude of all the friends of the Institution, and to the appreciation of all the citizens of the State.

Adopted.

Mr. Quick moved that the Regent be authorized to issue a circular, giving information touching the terms of admission of students to the University. Carried.

Mr. Cunningham moved that the Secretary of this Committee be authorized to procure a suitable book, in which the minutes of the proceedings of the Committee may be kept.

The motion was carried.

The Committee adjourned until 7½ o'clock, p.m., to meet at the Houston House.

EVENING SESSION.

Met at the Houston House at 7½ o'clock, p. m., pursuant to adjournment. Regent in the Chair. Quorum of members of the Committee present. Proceeded to business.

Mr. Cobb moved that the Regent and Dr. Scroggs be a committee, to negotiate with McKinley & Burnham for forty acres of land lying between the horse railroad and the 160 acre tract, at a

price not exceeding $180 per acre; also, to negotiate for the two lots lying between the Springfield road and the horse railroad; also, to obtain offers for the Griggs farm, or some part thereof, and report at the next meeting of the Executive Committee. Motion carried.

Mr. VanOsdel offered the following; which was unanimously adopted:

Resolved, That owing to the condition of the farm, also of the finances of the Institution, that it is deemed inexpedient to employ any person as Farm Superintendent, or Practical Farmer and Horticulturist, at the present time.

The following bills were reported, examined and allowed:

T. Quick, expenses at May meeting	$19 05
T. Quick, expenses at June meeting	16 30
I. S. Mahan, expenses at May meeting	22 52
I. S. Mahan, expenses at June meeting	17 95
J. M. VanOsdel, expenses at May meeting	23 50
J. M. VanOsdel, expenses at June meeting	17 50
	$116 82

Moved and adopted, that when this Committee adjourns it shall adjourn to meet on Friday, the 23d of August next, at the University building, at 8 o'clock A. M.

The Committee then adjourned.

JOHN M. GREGORY,
Chairman Executive Committee.

J. W. Scroggs,
Secretary Executive Committee.

August 23d, 1867—9 *A. M.*

Pursuant to adjournment, the Executive Committee of the Illinois Industrial University met at the College building.

Committee called to order by John M. Gregory, Regent.

Present, John M. Gregory, J. M. VanOsdel, J. Emory Cobb, J. H. Pickrell, I. S. Mahan, J. W. Scroggs, M. L. Dunlap and J. O. Cunningham.

Mr. Flagg, being present, was invited to take a seat with the committee.

Upon the adoption of the proper motions, the following bills were allowed, and the Regent ordered to draw the necessary orders upon the Treasurer for their payment.

Illinois State Journal Company	$85 00
J. W. Scroggs, com. on lumber—expenses to Chicago	21 00
O. O. Alexander, County Recorder	2 50
H. Seranned, Druggist	8 00
Harris & Co., Lumber merchants	9 10
J. O. Cunningham, for surveying farm and moving fence	62 00
Stone contractor, for stone for front entrance	12 80

Mr. Cobb moved that the matter of insurance be referred to a committee of three—Messrs. Gregory, Scroggs and Cunningham, with power to act. Carried.

A motion was made and adopted, making Dr. Gregory a committee on repairing roof of the University.

Moved, that when this Committee does adjourn, it adjourns to meet at the call of the Regent. Carried.

The Committee on Farms, together with the Executive Committee, made a tour of observation to the several farms belonging to the University.

It was

Resolved, That the permission of this Executive Committee is given to the authorities of Urbana, to extend Green street across the west half, northeast quarter section 18, township 19, range 9 east, third principal meridian.

The resolution was adopted.

It was moved by Mr. Cobb, that the Treasurer of the University be instructed to pay all expenses attending the sale or location of the land scrip, on warrant of the Regent, and that he keep and render a separate account of such expenses. Adopted.

EVENING SESSION.

Dr. Gregory in the Chair. Committee called to order. Members all present.

Moved and adopted, that Dr. Gregory's bill of expenses to —— be allowed, and an order drawn on the Treasurer for the amount, viz: $20 50. Carried.

Resolved, That a committee of three be appointed, to procure from the proper parties the best terms upon which the ground east and west of the University building, can be purchased, and report at the next meeting of the Executive Committee.

Carried.

(Report of the Committee was referred to the Finance Committee, with instructions to report at the annual meeting of the Board, in 1868.—*Rec. Sec.*)

Moved, that J. O. Cunningham be authorized to rent the Griggs farm. Carried.

Resolved, That J. O. Cunningham be authorized to have the Busey buildings insured, and that the Regent be authorized to draw a warrant upon the Treasurer for the payment of the same.

Adopted.

Resolved, That J. O. Cunnningham be instructed to confer with the Board of Supervisors, or the Committee from said Board, upon the further sale of lots to the University.

Adopted.

On motion, Mr. Flagg's account was allowed. Amount, $20 45.

On motion, Mr. VanOsdel's bill was allowed. Amount, $13 50.

The Committee, on motion, adjourned.

J. M. GREGORY.
Chairman Executive Committee.

J. W. SCROGGS,
Secretary Executive Committee.

UNIVERSITY BUILDING, *Oct.* 18*th*, 1867.

Pursuant to call the Executive Committee of the Illinois Industrial University, met at the University building, on Friday, Oct. 18th, at 9 o'clock A. M.

Present—John M. Gregory, J. O. Cunningham, J. H. Pickrell, T. Quick, J. M. VanOsdel, M. L. Dunlap and J. W. Scroggs.

Moved by J. O. CUNNINGHAM, that the report of Mr. VanOsdel on portico for the front entrance of the University buildings be adopted, and the work pushed forward to completion.

Mr. Cunningham's motion was adopted.

Mr. M. L. DUNLAP then offered the following:

WHEREAS, By section 4, of the Act of Congress donating lands to the several States, approved *July, 1861, it is provided that* "in order to promote the liberal

and practical education of the industrial class, in the several pursuits and professions in life;" and that section 7, of the act to provide for the Illinois Industrial University, says the Trustees "shall, so far as practicable, arrange all the regular more important courses of study and lectures in the University, so that the students may pass through and attend upon them, during the six Autumn and Winter months, and be left free to return to their several practical arts and industries during the six Spring and Summer months."

Section 8 provides that, "students shall have attained the age of fifteen years, and shall have passed a satisfactory examination in each of the branches ordinarily taught in common schools of the State." Section 9, in regard to honorary scholarships, says, that "all such shall be selected from the common schools of the State, and shall be those who have attained the greatest proficiency in the branches of learning usually taught in the common schools of the State; and,

WHEREAS, it is no doubt the intention not only of Congress, but of the State Legislature, that this University should be for the benefit of the industrial classes attending the common schools of the State, and that said University should be in session during the winter.

Therefore be it ordered, that without opening the school in the regular course, that there be a winter session of twelve weeks, commencing the first Monday in December, 1867; that there be admitted to said school one honorary scholar from each county, as provided by section 9, of said act, and that the County Superintendent of schools of each county be authorized to select two persons who shall act with him in the examination, and who shall form a board of examination for the purpose to determine who of said applicants shall be entitled to said honorary scholarships; and that the said board shall examine all the applicants, students from the common schools of the State of Illinois, and if they pass a satisfactory examination in all the branches ordinarily taught in the common schools of the State, and shall be of the age of fifteen years, and shall bear a good moral character, the said Board shall give to each of said students a certificate of the same, setting fourth their age, place of residence, and the school district from which they are to be transferred. These examinations should be made as early as November 15th, and a report made to the Regent of the University, and by him to be reported to the Executive Committee, who will meet at the University on Thursday, Nov. 20th, 1867, to consider how many of said applicants can be accommodated in said schools. That if there are more applicants than can be provided for in said University, that they be admitted from each county in proportion to population as determined at the last census, and that these be determined by lot. That the course of study at said sesson, shall, in all cases, be a thorough review of all the branches ordinarily tanght in the common schools of the State. This is quite necessary and proper, for the single reason that a student of fifteen years of age, who shall pass a satisfactory examination in the branches before stated, are to be admitted into the University, and as these have not fully mastered all of these branches of learning, it is but just that they be thoroughly instructed in them by a careful review. Beyond a review of the elementary branches, the student shall select one or more branches allied to Agriculture or the mechanic arts, viz: Chemistry (elementary), Botany, Mathematics, Entomology, Veterinary Science, Book-Keeping or Natural Philosophy.

To carry on this session of school, teachers of well known ability shall be employed, with the view of being appointed as professors at the opening of the regular course of the University in March, should they give full satisfaction.

COURSE OF LECTURES.

In addition, and for the purpose of complying with the spirit and letter of the law, there shall be a course of lectures. The first one to be delivered on Tuesday evening, December 10th, 1867, and the others shall be directed hereafter by the Executive Committee, a programme of which shall be published, and which lectures shall be free to all who may wish to attend. The course of lectures shall embrace Practical Agriculture, Horticulture, Practical Mechanics, Engineering, both civil and military, Botany and Vegetable Physiology, Chemistry, as applied to Agriculture and the Arts, Geology in its relation to the soil and to minerals, Natural Philosophy, Veterinary Science, and Law as applied to agriculture and mechanics.

That the Corresponding Secretary, ———, and ———, be a committee to arrange said course of lectures, and to engage the lecturers; provided that most of these shall be residents of the State of Illinois and that the maximum compensation for each lecture , including expenses, shall not exceed ——— dollars.

On motion of J. O. CUNNINGHAM, Mr. DUNLAP's communication was laid upon the table until 3 o'clock, P. M.

Moved by J. O. CUNNINGHAM, that all the inside painting to be done upon the University shall be grained, in imitation of oak, and that the Regent shall designate such rooms as in his judgment shall be so grained this fall.

Adopted.

Mr. CUNNINGHAM further moved that J. W. SCROGGS be authorized to procure such cases for specimens of natural history and for books, as the Regent may direct, and that the Regent draw an order for the bills of the same.

Adopted.

Mr. QUICK offered the following:

WHEREAS it was ordered by the Board of Trustees, that five hundred dollars be appropriated to defray, in part, the Powell expedition, which order was omitted in making up the records of the May meeting of the Board. And whereas, the Regent, in pursuance of such action of the Board, did issue a warrant for the amount; therefore,

Resolved, That his action in the premises be approved.

Carried.

The report of the Committee on additional lots was then offered:

To the Executive Committee of the Illinois Industrial University :

The Committee to whom was referred the purchasing of lots east and west of the University grounds, would beg leave to report that they have seen the parties owning the lots on the west side, and that the whole can be purchased for $2300; and in consideration of the fact that, by so doing, that an avenue can be made straight with the west line of the recent purchase, connecting the main lands with the College grounds, would recommend that said purchase be made, and that the Committee have further power to carry out *such suggestions*, and complete the purchas-

ing of said lots represented in the plat here presented (which is made a part of this report); and that the Regent be authorized to draw warrants for the payment of the same; also, that the Committee be instructed to procure a road, of the width of eighty feet, on the west side of the purchase of Os Well's tract, at contemplated in said plat. Also, that the matter of the purchasing of the lots on the east side be left for further consideration.

[Signed] J. W. SCROGGS,
J. H. PICKRELL,
M. L DUNLAP,
Committee.

AFTERNOON SESSION.

Oct. 18, 1867, 2 *o'clock P. M.*

A quorum being present, and the Regent in the Chair, the Committee proceeded to business.

The REGENT presented a bill for a seal and letter-press, which was allowed; amount $45.

The following resolutions were offered by J. O. CUNNINGHAM, and, after reading, unanimously adopted.

Resolved, That neither the Board of Trustees, the Executive Committee, nor any of the officers of the Board, have in any way authorized the publication of a paper, to be called the "*Saturday Courier*," as under the patronage of the Illinois Industrial University, or in any way connected with the University, as used in printed reports, to give character to said proposed paper or to the scheme of premiums connected therewith.

Resolved, That the papers in Chicago and elsewhere, be requested to copy the foregoing.

On motion of Mr. J. H. PICKRELL, Mr. DUNLAP's communication relative to the course of study to be pursued in the University was taken from the table. After a full and free discussion of the same, the following resolutions were offered, in relation to the matter, by Mr. PICKRELL, and adopted by the Committee:

WHEREAS, The Board of Trustees of the Illinois Industrial University fixed the time of opening the school in March, 1868; therefore,

Resolved, That the communication of M. L. Dunlap be referred to the whole Board for further consideration.

Resolved, That the Regent request the Standing Committees to be ready to report to the whole Board when convened.

Resolved, That the interests of the University demand that there should be a called meeting of the Board, on the 26th of November next.

Adopted.

Mr. DUNLAP offered the following resolution, which was adopted:

Resolved, That the Regent be requested to report to the Committee the amount of orders drawn on the Treasurer, and for what purpose they were drawn; also, that the Finance Committee be requested to report their action in regard to locating the land scrip, and also that these reports be prepared in time for the next meeting of this Committee.

Mr. DUNLAP's report on rent of farm was placed on file.

Mr. QUICK offered the following resolution, which was adopted:

Resolved That we consent to the opening of the Cemetery road, running along the west line of the 160 acre farm of the University, to the width of five rods, by equal additions from each side.

On motion of J. O. CUNNINGHAM,

Resolved, That we give the right of way to the D. U. B. & P. R. R. Co., across the west half of west half northeast quarter section 18, T. 19, R. 9, provided said company erect and keep in repair the fences along that portion of said road passing through said land.

[This resolution was disavowed by the Board of Trustees, at the meeting held Nov. 27, 1867.—O. B. GALUSHA, *Rec. Sec.*]

On motion of M. L. DUNLAP, it was

Resolved, That Dr. J. W. Scroggs be appointed a Committee to have charge of the buildings and grounds immediately about the University, to superintend the repairs, alterations and structures that may be required, and shall hold his office until the next meeting of the Board of Trustees.

[This Committee was discharged by vote of the Trustees, Nov. 27, 1867.—*Rec. Sec.*]

Mr. CUNNINGHAM moved that permission be given to the road Commissioners of Urbana township to lay out a road on the south side of the 160 acres known as the Model Farm.

Referred to Committee on Farm.

The account of C. G. Larned, for a stove and hardware, was allowed, and the Regent ordered to draw a warrant for the payment of the same. Amount $35.

Mr. DUNLAP offered the following resolution:

Resolved, That Emory Cobb be appointed a Committee to purchase (25,000) twenty-five thousand feet of lumber at Chicago, and that five or ten thousand (5000 or 10,000) feet of common boards, to be included in the amount, be stuck up for drying, and that the Regent draw an order for the payment of the same.

The following report was made by Mr. DUNLAP:

To the Executive Committee of the Illinois Industrial University:

The undersigned having been appointed a Special Committee to inquire in regard to the removal of buildings and shade trees from the Busey farm, also in regard to the rental of the same, begs leave to report:

The house reported to have been removed was sold and removed prior to the purchase of said farm, or the contract made by the authorities of Champaign county. Several Red-Cedar trees, of little value, were taken by Mr. Busey, after the sale, out of a small cluster of trees standing on the ground sold.

It would appear that by the agreement with the Board of Supervisors, that Mr. Busey proposed to pay, as rent for the said farm, the sum of two thousand dollars ($2000), with the understanding that the farm should be paid for March 1st, 1867, at which time the rent would commence, and terminate March 1st, 1868; but this agreement was not consummated, and the payments were made May 1st, 1867. He therefore claims the right to use said farm until May 1st, 1868, and pay the sum of two thousand (2000) dollars; or he will give possession of all the meadows, pastures and cultivated lands this fall, retaining one feed lot, with the stable, to enable him to feed the stock now on the farm, March 1st, 1868.

That he will give up the house, if desired, by the 1st of January next, or that in case he remains in full possession, that he will not allow any stock on the meadows, pastures, stock-field or orchard, and take good care of the house until the said first day of March, 1868. and pay rent for the same, fifteen hundred (1500) dollars, and at that time give peaceable possession. In the mean time the said trustees can go on and use any part of the said farm at any time hereafter, except to interfere with the feeding of said stock, and the securing of his said crop. Your Committee would therefore recommend that the Secretary of the Executive Committee make a contract with the said J. S. Busey, on the terms proposed, to terminate possession March 1st, 1868, and that he advise the Chairman of the Farm Committee of his action in the premises. Respectfully submitted.

[Signed] M. L. DUNLAP,
Committee.

Mr. J. . CUNNINGHAM, Committee upon Farm Rents, submitted the following report:

To the Executive Committee of the Board of Trustees of the Illinois Industrial University:

The undersigned would report that, as the agent of the University, he has collected rents for the current year as follows:

From Ennis, on Griggs farm	$49 05
From Ennis, on Clements farm	47 45
	$196 50

Sept. 23d, 1867.

[Signed] J. C. CUNNINGHAM,
Committee.

On motion Mr. CUNNINGHAM's report was received by the Committee.

The Committee then adjourned, subject to the call of the Regent.

JOHN M. GREGORY, REGENT.
Chairman.

J. W. SCROGGS, *Secretary.*

INAUGURATION OF THE UNIVERSITY.

MARCH 11, 1868.

The inaugural ceremonies of the University took place in the University hall, commencing at 9 o'clock. A large attendance of the citizens of Champaign and Urbana, besides the Board of Trustees, and distinguished guests from other parts of the State, filled the hall to overflowing. The platform and walls were suitably draped with the national flag. The wall, in the rear of the platform, was decorated with a picture of Washington, the great Farmer of the Revolutionary period, supported on either hand by the American eagle, and crowned above, in letters of evergreen, with the University motto, of "Learning and Labor."

The Hon. S. W. Moulton, of Shelbyville, in compliance with the invitation extended by the Board of Trustees, presided. A choir of fifty singers, under the direction of George F. Root, of Chicago, assisted by R. M. Eppstein, of Champaign, with two pianos, furnished the music for the occasion.

The exercises were introduced by a voluntary, from Root's Cantata of the Haymakers, entitled, "How good is He the Giver." Selections of Scripture were then read, by Rev. C. D. Nott, of Urbana, after which, prayer was offered by Rev. J. H. Noble, of Champaign.

The Hon. S. M. Moulton made a few appropriate remarks on taking his place as presiding officer. He returned thanks for the honor done him; an honor conferred, he felt, in consideration of his long continued connection with the educational interests of the State, rather *than to any personal* merit of his own. For

twenty years he had been identified with the educational improvements of the State; and in everything concerning its advancement he had been, and should remain, a radical.

The progress of the State had been marvelous. There were still old fogies, but they were passing away, and men with larger culture and more deeply imbued with the spirit of the age were taking their places. As an instance, twelve years before some of the most eminent men of Illinois had undertaken to lay before the Legislature a bill providing for the erection of an Industrial University. But the prejudices of the legislators were such that only two entertained it at all, and it was not introduced. Now we met under the sanction of the law, backed up by the public opinion of all the people, determined to carry out the great enterprise before us.

He, too, having a stake among them, had met to aid in inaugurating the Illinois Industrial University. When they reflected that four-fifths of the people were engaged in agriculture, and nine-tenths were interested in the results, and that every art was brought in to the aid of agriculture, ought they not to have an institution specially devoted to it?

It ought to be founded on the broadest principles, embracing all arts and sciences that might enable their sons the better to succeed in agriculture or mechanics. If the trustees did not do that, they would fail, and ought to fail. But he did not fear this. The University would succeed. We wanted men of education, and it would give them. He, for one, would stand by the Institution. The people of his section of the State were determined to sustain it. It was what they wanted; and he was sure it would be appreciated by all the people of the great State of Illinois.

A quartette—"Lord, forever at Thy Side," was then sung by Mrs. Ingersoll, Mrs. Hollister, Mr. Sawyer and Mr. Sweet.

The following letters, from invited guests, who were not able to be present, were then read:

STATE OF ILLINOIS, EXECUTIVE DEPARTMENT.

SPRINGFIELD, *March* 10*th*, 1868.

To the Board of Trustees of the Illinois Industrial University:

GENTLEMEN:—Until to day I had hoped to join you to-morrow, at Urbana, in the services of the formal inauguration of the Illinois Industrial University. The importance of this occasion can not be too highly appreciated. You are about to ive practical effect to a natural idea, and to start into existence a new method of

education, under the sanction of State legislation, the paramount and well defined object of which is to open to the practical students of the industries of the State a plain road to the acquisition of all attainable knowledge, through consecutive scientific channels, pertaining to and bearing upon the productive interests of our entire farming and mechanical population. The world progresses, and without this noble agency would continue to progress in the discovery of the means to improve, advance and elevate the occupation of labor; but you are the Trustees of a system which, carefully watched and appropriately managed, it is confidently hoped by all is to add a new impulse to labor, to turn the key which is to unlock and distribute what has been hidden or imperfectly understood in past times.

Our broad and fertile prairies, our indomitable and industrious population, invite the experiment, and offer the finest opportunity for the development of a new system. Nevertheless, we are a purely practical people, and will not be slow, may be even hasty, to expect results.

The law of Congress is very plain. The College is to teach such branches of learning, as are related to the agricultural and mechanic arts, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life, not, however, excluding the scientific and classical studies and military tactics.

The University is suitably located, in one of the best portions of the State, and is surrounded by an agricultural population, and encouraged by the wishes of all who desire the success of any scheme to promote human happiness. Doubtless you are to be subject to criticism, for this is the proper privilege of all; but, may I venture to hope, it is not to be unrelenting or unreasonable. It ought not to be forgotten, that, actuated by a commendable desire to serve the cause of education, as well as the cause of honest industry, you have voluntarily, and without compensation, given your time and intelligence to the organization and management of this experiment. For myself, thanking you for all that has been done, and commending your labors to the favorable recognition and approval of the people of our State; with the ardent hope that all, and more than has been expected, is to be realized from this University, I remain, most respectfully,

Your obedient servant,

R. J. OGLESBY.

WASHINGTON, D. C., *March* 2, 1868.

DEAR SIR:—I have the honor to acknowledge your kind invitation to attend the inauguration ceremonies, upon the opening of the Illinois Industrial University.

With much regret I am compelled to forego the great pleasure which it would afford me to be with you on an occasion of so much interest. The extraordinary condition of public affairs compels me to remain here, and the continual demands upon my time and strength must be my excuse for not writing at greater length.

My appreciation of the vast interests involved in a successful administration of the affairs of the University demands a more particular statement of the origin, history, objects and prospects than I can find time to write. My great hope is that this Institution shall prove the crowning achievement of this age, among all the grand works in behalf of popular education which illustrates the splendid history of our State, and that to the latest generation our young men shall have cause to bless the wise forethought of the men of this age, who have, amidst gigantic war, not only vindicated the free institutions and ideas of self-government, but also

founded this splendid nursery of freemen and enlightened patriotism. An educated man may become unpatriotic, a patriot may become perverted, through ignorance; but wisdom and patriotism, hand in hand, are invincible. Enlightened patriotism is the steadfast palladium of human liberty.

May the institution over which you are called to preside be enabled to illustrate and enforce this vital truth through all the years of glorious and prosperous peace which await our State and nation, is the sincere wish of Illinois' grateful son,

RICHARD YATES.

HON. J. M. GREGORY,
Champaign, Ills.

GALESBURG, ILL., *February* 29, 1868.

J. M. GREGORY, D. D.

MY DEAR SIR:—I have received yours of the 24th inst., inviting me to be present at the inauguration exercises of the Industrial University. I am much obliged to you for the invitation, and regret not to be able to accept it. The official duties of the members of our court make an almost unceasing demand upon their time, and hardly less when the court is not in session than during term.

Allow me, however, to express my very deep interest in your noble undertaking, and my most earnest wishes for its success. Every citizen of Illinois who would promote the future greatness of the State, and secure the well being of his own children, should lend you a hearty co-operation.

Illinois can hardly fail of a merely material prosperity. God has so endowed us with the means of wealth, that we can not but attain it, if the country remain at peace. But we need more than that, and must accomplish more, if not false to our duties. We should reach, on these prairies, the highest standard of modern civilization, by the most complete development of the individual man in every class of society. The means of the highest mental and moral culture should be furnished to every youth. To this end we shall have, in my opinion, no agency equal to the institution you are about inaugurating, if you are able to build it up in accordance with your plans. From an examination of your published report and schedule of studies, and from what I have learned of your views in conversation, I am satisfied you will, if you are properly sustained, create, in the largest and best sense of the word, a *University*, where the youth of our State can be taught, according to their respective tastes, talents and plans in life, in every department of human knowledge, while the highest practical training will, at the same time, be given in agriculture and the mechanic arts—an institution resting on a broader basis, aiming at a wider usefulness, and furnishing a culture at once more generous and more practical than any other in the country. I wish you God speed, and am,

Very truly yours,
C. B. LAWRENCE.

TISKILWA, *March* 10, 1868.

HON. J. M. GREGORY,
Regent of Industrial University.

DEAR SIR:—Permit me to acknowledge the receipt of your invitation to attend the inaugural exercises, to take place to-morrow, at Champaign, and to express my sorrow that severe illness forbids me the enjoyment of the pleasure I had anticipated in visiting Champaign on this interesting occasion.

In my opinion, the inauguration of the Industrial University will ever be regarded as an important incident in the educational progress of our State. The character of the institution to be inaugurated is a true and just response to the demands of the *cultivators* of the grand and fertile prairies of our State. Let a generous and elevated spirit control the management of the University. Let the baleful influences of partisanship and sectarianism be excluded from its halls. Let an eye single to the physical, intellectual and moral advancement of the sons of the prairie State watch over and direct its operations. The affections and just State pride of our citizens will cluster around it; the patronage of our State Legislators will sustain it, and endow it still more liberally; the industrious and worthy of our sons will throng its halls. Its usefulness and destiny will be *Excelsior.* Man will be blest, and glory given to the Sovereign Ruler of the Universe.

I shall await with much interest the published proceedings of the inauguration.

You will please accept, as an apology for this pencil note, the fact that confinement to a sick bed prevents my participation in the pleasures of the occasion.

Yours very truly,

B. N. STEVENS.

WASHINGTON, *March 6th,* 1868.

J. M. GREGORY, ESQ.

DEAR SIR:—Your kind favor, with card of invitation to the inauguration of the "Illinois Industrial University, is received." Nothing would give me more pleasure than to comply with your invitation; but I fear that duties more arduous than pleasant will prevent.

Yours, truly,

JOHN A. LOGAN.

WASHINGTON, D. C., *March* 3, 1868.

HON. J. M. GREGORY,

Regent Illinois Industrial University.

MY DEAR SIR:—Your letter, inviting me to be present on the occasion of the inauguration of the Illinois Industrial University, on the 11th inst., has been received. I shall not be able, consistent with public duty here, to be with you.

I wish I could attend. I look forward to the day when that institution will be a great benefit to the people of our prosperous State. Education and labor, joined together, is the great need of the people. Honest, intelligent work is what makes a people worthy and powerful.

Your Institution, properly fostered by the State, and managed well by those in immediate charge, is destined, in a few years, to wield a powerful influence for good in the country.

Hoping you may have a pleasant time at your inauguration ceremonies, and that the University may meet with great success,

I am, in haste, yours very truly,

S. M. CULLOM.

WASHINGTON CITY, D. C., March 1, 1868.

DEAR SIR:—Your favor of the 27th ult., inclosing an invitation to the Inauguration of the Illinois Industrial University, is just received. It would afford me great pleasure to be with you on that interesting occasion, but my engagements here will render it impossible for me to leave Washington at the time indicated.

Thanking you for the courtesy in extending to me the invitation,

I have the honor to be, very respectfully, etc.,

S. S. MARSHALL.

J. M. GREGORY, ESQ.,
Champaign, Illinois.

WASHINGTON, D. C., *March* 4, 1868.

J. M. GREGORY, ESQ.,
Illinois Industrial University, Champaign, Ills.:

DEAR SIR:—Yours of the 26th ult., inclosing a card of invitation to attend the inauguration of the Illinois Industrial University, on the 11th inst., was duly received.

Feeling a deep interest in the complete success of the enterprise, it would afford me great pleasure to be present and witness the ceremonies of the occasion, and I regret that my duties here will necessarily prevent my attendance.

In every country, labor is the foundation of wealth, prosperity and happiness. In this country of free government and equal rights, where agriculture enjoys the attention of the great masses of the people, how important it is to cultivate a taste for farming and farm labors, by elevating the business to a science, and by this means simplify the processes and increase the ratio of production.

Your University, devoted in the main to the encouragement of all the industries of the age, will, I have no doubt, effect great good for our people.

Trusting that the occasion of the inauguration of the University will be one long to be remembered with interest, I subscribe myself,

Truly and respectfully, yours,

GREEN B. RAUM.

The University anthem, written for the occasion by Dr. Gregory, and set to music by George F. Root, was then sung.

I.

We hail thee! Great Fountain of learning and light;
There's life in thy radiance, there's hope in thy might;
We greet now thy dawning, but what singer's rhyme,
Shall follow thy course down the ages of time?

II.

O'er homes of the millions, o'er fields of rich toil,
Thy science shall shine as the Sun shines on soil,
And Learning and Labor—fit head for fit hand—
Shall crown with twin glories our broad prairie land.

III.

And as generations, in the grand march of time,
Shall fill the long ages with numbers sublime,

Thy portals shall throng with the lowly and great,
Thy Science-crowned children shall bless all the State.

IV.

Then hail thee! blest fountain of learning and light,
Shine on in thy glory, rise ever in might;
We greet now thy dawning; but ages to come
Must tell of thy grandeur, and shout Harvest Home.

Dr. NEWTON BATEMAN, State Superintendent of Public Instruction, then delivered the following

ADDRESS:

A great State has just embarked in a great enterprise, and here, at the very threshold, it is fit that we pause a moment to consider the history of that enterprise, its nature, and how we may hope to conduct it to a successful issue.

What, then, is the Illinois Industrial University, which we to-day inaugurate—for what ends has it been established—and by what means shall we seek to achieve those ends?

The practical realization of nearly every grand movement of the forces of civilization, is the sequence—usually the long-delayed, long waited-for sequence—of many silently-working, far-distant causes—the final embodiment of the struggling thoughts, aspirations and yearnings of the public mind.

To this historical fact the Institution, which we to day place in the grand column of the educational forces of this commonwealth and of the nation, is no exception. It is not a thing of yesterday; it is born of no transient impulse of the public mind—of no meteoric flash of popular enthusiasm—no sudden faith in the royalty of labor, and the exaltation of the laborer. The ideas which underlie and have at length fashioned it into being, have long been before the American people, and are indeed, in some sense, co-eval with the existence of the Republic itself. Washington and Jefferson, and many others of that day, were practical agriculturists, and did much to foster a love of industrial pursuits among their countrymen, and to lay under contribution the treasures of science, to enhance the productiveness of soils, and ennoble the employments of husbandry. And from that period to the present, there have been those who, from time to time, have directed public attention to the transcendent importance of this great department of our national industries, and to the need of institutions of learning devised and conducted with more direct reference thereto.

But the era of great combined movements, in this country, in behalf of the better education of the masses for the manual industries of life, may be said to have commenced about twenty years ago. And, whether considered in the light of the magnitude of the interests involved; the millions of people concerned in the issue; the grandeur of the thoughts and conceptions advanced; the number, eminence and power of the men engaged; or the undaunted persistency and faith with which the contest has been carried on—whether viewed in one or all of these aspects, this era of effort and conflict for industrial education deserves to be called *sublime*.

Convention after convention was held; league after league was formed; society after society was organized; pamphlets, appeals and addresses were written and published by tens of thousands of copies; petitions and memorials went up from

the lakes to the sea; the law-making power was invoked, and earnest, determined men thundered again and again at the doors of General Assemblies and Congressional Halls, demanding to be heard on this great question. At times, in some of the States, the issue went to the hustings, and even the tumultuous roar of rival political parties was awed and hushed for a time by the great voice of the toiling masses, demanding an education suited to their needs. Repeated disappointments and defeats only resulted in fresh combinations, more determined efforts, and large accessions of strength. Able and gifted men from every pursuit in life, from every class of society, and from every quarter of the Union poured into the swelling tide the contributions of their learning, experience and genius.

In the West, the man whose voice rang out earliest, loudest and clearest, in this great movement—whose words pealed and thundered through the minds and hearts of the people, and the round shot of whose tremendous broadsides of irrefragable facts and logic, and fiery rhetoric, plowed and plunged and ricochetted through these prairies, with an energy and vehemence that no bulwarks of ignorance or apathy could withstand, and which brought nearly every farmer and artisan hurrying to his standard, from far and near, and put in motion the imperial columns of our free-born yeomanry—the man who threw into the struggle not only the best energies of his mind, but the unwavering faith of his soul and the deepest longings of his heart, and who'plead for the uplifting and regeneration of the masses and for the "millennium of labor," as the patriot pleads for his country and the christian for the salvation of God—the man whose able reports, instructive addresses, and thrillingly eloquent speeches were caught up and re-echoed by the enlightened press of the whole country, without regard to sect or party, and which furnished at once the material and the inspiration of auxiliary and co-operative movements and organizations in many other States—and the man who, as I believe, through all these multiplied and overwhelming labors, was animated not by considerations of self-aggrandizement or sordid gain, but by the loftier purpose of serving his race and honoring God by uplifting and blessing the toiling millions of His children—that man was Jonathan Baldwin Turner, of Illinois.

This is not blind adulation nor fulsome eulogy. I know whereof I affirm; I am familiar with the procession of events to which I have referred, and the connection of that great and good man therewith; and I could not suffer this glad day to pass without a few words in vindication of the truth of history, and a grateful recognition of his services. I speak in this matter only for myself, and at the promptings of my own feelings and judgment—no other person is in any manner responsible for what I have said, or may say, in this regard.

And if I speak warmly of Prof. Turner as a man, it is because I have known him over thirty years, during twenty of which he was my near neighbor, during four of which he was my teacher, and during all of which he has been my friend, ever kind and true. If his right to the place to which I have assigned him as the western pioneer and leader in this great educational movement, is challenged, I refer to the printed records and documentary history of the whole agitation, from the convention at Granville, in November, 1851, down to the passage of the bill creating this Institution, in February 28th, 1867. Through all those sixteen years of struggle and effort, you will find him towering up as the central figure, the very Ajax of the fight; closely identified with every phase of the controversy, and with all its vicissitudes of fortune. His reports, addresses, memorials and other papers, are

scattered through all the earlier published Transactions of the State Agricultural Society: the record of his personal labors is in fact, in epitome, a record of the whole movement.

But I have also referred to the commanding ability and power with which he led the forces of the people, and championed their cause in the grand march to the gates of Washington, and the final achievement of the supreme purpose—*national recognition* and aid by acts of Congress. None who have heard him will dissent: let those who have not, read his ringing oration on the "Millenium of Labor," delivered in 1853; or his Plea in behalf of "Industrial Universities for the people," published in 1854; or his Essay on "Industrial University Education," prepared by special request of the Commissioner of the National Bureau of Agriculture, and scores of other papers written and published during that period. The recognition, too, of the signal energy and grasp with which he handled the profound themes involved in the discussion, was general and hearty, not only from the rural and metropolitan press of the country, both East and West, but also from the solid columns of some of the oldest and stateliest Reviews, and even from Presidents and Faculties of existing Colleges and Universities, although utterly dissenting from and vehemently protesting against his views and opinions upon many points.

And this leads me to observe, that although I believe that Mr. Turner is justly entitled to the high honor of being called the *Father* of Industrial Education in the West, and that he should be (and sooner or later will be) held in grateful remembrance for having done more than any other one man in the United States to *arouse*, *inspire* and *vitalize* the public mind on this subject, impelling to investigation, thought and action, and thus hastening by many years, if not by a whole generation, the results already attained—yet I doubt if there is a man in the State, or even in the Union, who accepts, in detail, his theories, views, opinions and methods in respect to Industrial Universities, or to the practical education of farmers and mechanics, or even his theories of educational philosophy—certainly I do not. I regard not a few of his opinions and schemes on these subjects, as at war with both fact and reason—belonging to the realms of Utopia, and not to those of reason or history.

But then, Prof. Turner does not *expect* any body to think and believe and act precisely as he does—he would rather they would not—it would savor too much of a blind faith, which is the especial horror of his soul. He would a thousand times rather a man would *fight* him from honest conviction, than *indorse* him from stupid servility. I think that, upon the whole, he rather relished the criticism of the man who, after listening to an address from him on a certain occasion, remarked, "that was a magnificent thing, *but I don't believe a word of it*." He cares nothing for the *ipsisima verba*, in speaking or writing. So that he can get his harpoon well into the heart of the ugly whales of error that prowl God's great ocean of truth, he is not particular how it is done, or who drags the dead monsters to the shore. So that he effectually breaches the walls behind which cheats and humbugs are intrenched, he cares little what people think of his engineering. When pitted against an antagonist, his sole purpose is to knock him down, in the speediest and most effectual manner possible, and so that everybody can see that he *is* down, regardless of the rules of pugilistic science.

A sample or two will best illustrate his way of "moving upon the enemy's works:"

Speaking of the causes of failure in previous attempts to establish Industrial Colleges, he pulverizes one of them in the following style:

"One capital and fatal error has been the idea that we should send a boy to school to learn to *work*, and not simply to learn to *think*; thus absurdly attempting to teach, by public endowment and munificence, the little arts of *personal manipulation*, instead of the magnificent *science* of UNIVERSAL SUCCESS. Nothing could be more fatal. When I have taught a boy merely to hold a plow, I have only taught him to be a two-legged jackass, twin brother to the four-legged team in front of him. But when I have taught him truly and *scientifically* all the mighty mysteries of seas, stars, oceans, lands and ages that are concerned in that act of plowing, I have made a man of him—had we not better say, an angel? Art, in the sense of mere labor, mere servile imitation alone, is only animal; the common property of asses, dogs and monkeys. But true labor, inspired by universal science and intelligence, is not only characteristically human, but also Divine. What could be more absurd than to take a hundred boys, in their teens, away from their parents, the year round, and set them to dabbling with a hundred teams for a few hours per diem, half of which break their traces and run away the first hour, under the absurd pretext of teaching these boys how to plow? When Almighty God created the heavens and the earth, and ordered man to 'eat his bread by the sweat of his brow,' he created and most liberally endowed the best possible University for learning all such mere manual arts; and if we expect to supersede Omnipotence by grants of land for endowments in this line, it will prove worse than a Bull Run defeat; for no institution for teaching the arts and the habits of bare manipulation and industrial skill, can ever be endowed at all comparable with those which the great Father of All has most munificently spread abroad over every household, every shop, and every field, throughout the civilized globe. The *principles of science*, therefore, and not the bare manipulations of art, should form the *sole end* of Industrial Universities."

So wrote Prof. Turner, four years ago, demolishing a great fallacy and enunciating a great truth, in a manner not to be resisted or forgotten, whatever may be said of his zoological illustrations.

But I was briefly tracing the antecedent steps, the grand co-operative movements, which have culminated in the gift to us and to our children of this noble school of the people. When I turned aside, at the promptings alike of strong personal regard and a sense of justice, to speak of the labors of Prof. Turner, I intended to say but a very few words—merely to record my sense of the gratitude we owe for his long and powerful advocacy of the principles upon which this University is founded; the close and unquestionable connection of his services with the success that has been achieved, and my regret that he is here not to-day to mingle with us in congratulations for progress made, and in prayers for the continued blessing of God upon the school which we here consecrate to the reduplication of the products of labor, by subordinating thereto the forces of science, and to the exaltation of the toiling masses by putting them into closer and more intelligent communion with Nature, and Truth and God. I trust that I shall not, herein, be deemed to have been unmindful of the proprieties of the occasion.

Resuming the antecedent historical thread whose sinuous but unbroken course will be seen to have led straight on to the noble University which we to-day inaugurate, I observe that the first tangible result of the wide-spread and extraordinary agitation of the subject of industrial university education, which began with the Granville convention in 1851, and soon pervaded the whole State, and in behalf of which three more great Industrial State Conventions had already been held—was a Memorial to the General Assembly of Illinois, praying that body to invoke the pow-

erful aid and resources of the National Government itself, in furtherance of the object.

This memorial was drawn up and presented in January, 1853, and sets forth in cogent and eloquent terms the claims of the enterprise upon State and National regard. As a condensed and forcible statement of the argument, from the stand point of the farmers and agriculturists of the country, I do not think it has been surpassed.

Its conclusion, showing the comprehensive views, and advanced position taken in this State more than fifteen years ago, is as follows:

"We, therefore, respectfully petition the Honorable Senate and House of Representatives of the State of Illinois, that they present a united Memorial to the Congress now assembled at Washington, to appropriate to each State in the Union, an amount of public lands, not less in value than *five hundred thousand dollars*, for the liberal endowment of a system of Industrial Universities, one in each State in the Union, for the more liberal and practical education of our industrial classes, in their various pursuits, for the production of knowledge and literature needful in those pursuits, and developing, to the fullest and most perfect extent, the resources of our soil and our arts, the virtue and intelligence of our people, and the true glory of our common country. We further petition that the Executives and Legislatures of our sister States be invited to co-operate with us in this enterprise, and that a copy of the Memorial of this Legislature be forwarded by the Governor to the Governors and Senates of the several States."

Note the magnificent conception, the patriotic and continental sweep of that Memorial—*five hundred thousand dollars'* worth of the public domain, for the endowment of a system of Industrial Universities, one in each State of the Union! And this, I believe, was the initial step, the original suggestion, the first formal call ever made upon the National Government to endow these schools of the people—the first banner uplifted on the continent to lead the millions, through the puissant arm of the Republic itself, onward towards the millennium of labor. The simple grandeur of the conception, its startling munificence and universality, the majestic visions of the future which it invited, educated and inspired the whole American people, in this direction, more than a thousand elaborate orations could have done, and evoked a spirit that rested not till the prayer of that great petition was substantially answered by acts of Congress in conformity therewith. Is there not truth as well as boasting in the remark of one, that "the American people instinctively *hate little things?*" The author of that Memorial, and hence the first man in the United States, so far as I know, who ever advanced the great idea of the *National endowment* of Industrial Universities, an idea which has since ripened into such glorious fruitage, was an Illinoisan—the same of whom I have already spoken.

Scarcely was the ink of that Memorial dry, when it was presented, in due form, to the Legislature of the State, then in session. The reception it there met with was worthy alike of its commanding importance, and of the forecast and statemanship of a great Commonwealth. Instead of being "laughed down the wind," as the wild fancy of some dreaming enthusiast; or shuffled off to some unsympathising committee, there to sleep the sleep that knows no waking; or bartered away, by intrigue, for some wretched mess of local or political pottage—instead of this, that General Assembly *made way* for that grand message from the People, as the Lords and Commons make way for the King! acknowledging the majesty of its presence, and the exceeding glory of which it was prophetic.

Without unnecessary delay it came before the House, able and eloquent advocates sprang to its defense, opposition quickly yielded, and in due time, to their everlasting honor, that body unanimously passed the following resolutions. Though not strictly necessary to my present purpose, they are not irrelevant, and standing as they do at the very gateway of the great national movements that followed, I cannot resist the desire to cite them:

"WHEREAS, the spirit and progress of this age and country demand the culture of the highest order of intellectual attainment in theoretic and industrial science: *And, whereas*, it is impossible that our commerce and prosperity will continue to increase without calling into requisition all the elements of internal thrift arising from the labors of the farmer, the mechanic, and the manufacturer, by every fostering effort within the reach of the Government: *And, whereas*, a system of Industrial Universities, liberally endowed, in each State of the Union, co-operative with each other, and the Smithsonian Institution at Washington, would develop a more liberal and practical education among the people, tend the more to intellectualize the rising generation, and eminently conduce to the virtue, intelligence, and true glory of our common country: therefore be it

"*Resolved by the House of Representatives, the Senate concurring herein*, That our Senators in Congress be instructed, and our Representatives be requested, to use their best exertions to procure the passage of a law by Congress donating to each State in the Union an amount of public lands, not less in value than *five hundred thousand dollars*, for the liberal endowment of a system of Industrial Universities, one in each State of the Union, to co-operate with each other, and with the Smithsonian Institution at Washington, for the more liberal and practical education of our industrial classes and their teachers; a *liberal* and *varied* education, adapted to the manifold wants of a practical and enterprising people, and a provision for such educational facilities, being in manifest concurrence with the intimations of the popular will, it urgently demands the united efforts of our national strength.

"*Resolved*, That the Governor is hereby authorized to forward a copy of the foregoing resolutions to our Senators and Representatives in Congress, and to the Executive and Legislature of each of our sister States, inviting them to co-operate with us in this meritorious enterprise."

These resolutions were promptly, heartily, and as the records show, *unanimously* concurred in by the Senate, and, on the 8th day of February, 1853, received the approval of the Governor, who lost no time in forwarding authenticated copies, as requested in the last resolution; thus completing the glorious and unbroken record of Illinois, more than fifteen years ago, upon this great public measure.

The past at least is secure, and I will not disguise the pride I feel in thus adducing the irrefragable testimony of history to the fact that this Empire State of the West has the high and unchallenged honor of being the first to conceive and advance this idea and form of Industrial Education by national appropriation, and the first also to petition Congress, by a formal and unanimous vote of her Legislature, to grant the endowment.

Those ringing resolutions of our General Assembly not only elicited approving responses from all quarters, but seemed also to kindle the slumbering thoughts and sympathies of the people into a blaze of enthusiasm, and to inaugurate, at once and with resistless power, that decade of splendid efforts throughout the Union, which received their triumphant culmination in the Act of Congress of July 2, 1862.

A leading paper of New York City, Feb. 26, 1853, in an eloquent editorial upon our joint resolutions, declared: "Here is the principle contended for by the friends of practical education abundantly confirmed, with a plan for its immediate realization. And it is worthy of note, that one of the most extensive of public land States (Illinois), proposes a magnificent donation of public lands to each of the States, in furtherance of this idea. The Legislature of Illinois has taken a noble step forward, in a most liberal and patriotic spirit, for which its members will be heartily thanked by thousands throughout the Union. We feel that this step has materially hastened the coming of scientific and practical education for all who desire and are willing to work for it. It cannot come too soon."

Similar opinions were expressed by the leading newspapers of the whole North and East, and by all the principal agricultural journals and periodicals then extant, (as I could prove by copious extracts did time permit), while from the far South responses no less emphatic and cordial, swelled the accumulating volume of public opinion. The key-note struck by Illinois, was echoed by the Governors of other States in quick succession, in their annual messages—while orators, statesmen, authors, with College Presidents and Professors, the ablest and most gifted and honored men of the nation, entered the lists and mightily contributed to arouse, instruct and guide the public mind. Edward Everett, Marshal P. Wilder, Henry W. Cushman, John W. Lincoln, and others of like eminence, headed a movement in behalf of the liberal education of the industrial masses, in Massachusetts; while upon a single committee appointed by a convention held in the State of New York, in furtherance of the same cause, appear the illustrious names of Francis Wayland, Bishop Potter, Washington Irving, President Hitchcock, and Professors Pierce, Henry, Bache, Mitchell, Dewey, and others.

But enough; the columns of the people were in motion, their Representatives were already in Congress, the great battle was fought and won, and it only remained to embody the popular will in the forms of law.

Accordingly, the Congress of the United States recognized and gave effect to these great principles by the passage of an act entitled,

"An Act donating Public Lands to the several States and Territories which may provide colleges for the benefit of Agriculture and the Mechanic Arts."

This act was approved on the 2d day of July, 1862. Its most important sections are the *first*, which makes the endowment, and the *fourth*, which declares to what objects and uses the fund shall be devoted. The first section reads as follows:

"That there be granted to the several States, for the purpose hereinafter mentioned, an amount of public land, to be apportioned to each State, in quantity equal to *thirty thousand* acres for each Senator and Representative in Congress, to which the States are respectively entitled by the apportionment under the census of 1860."

The fourth section reads as follows:

"That all moneys derived from the sale of lands aforesaid, by the States to which the lands are apportioned, and from the sales of land scrip hereinbefore provided for, shall be invested in stocks of the United States, or of the States, or some other safe stocks, yielding not less than five per cent. upon the par value of said stocks; and that the money so invested shall constitute a perpetual fund, the capital of which shall remain forever undiminished, and the interest of which shall be inviolably appropriated by each State, which may take and claim the benefit of this act, to the endowment, support and maintenance of at least one college, where the lead-

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ing object shall be, without excluding other scientific and classical studies, and including military tactics, to teach *such branches of learning as are related* to agriculture and the mechanic arts, in such manner as the legislatures of the States may respectively provide, in order to promote the *liberal and practical* education of the industrial classes in the several *pursuits* and *professions* of life."

The Legislature of Illinois promptly signified its acceptance of the grant, upon the conditions imposed by the act of Congress, and, at its last session, consummated the whole transaction by passing, 1st, "An Act in relation to the *location* of the Industrial University," approved January 25th, 1867. 2d. "An Act to provide for the organization and maintenance of the Illinois Industrial University," approved February 28, 1867. 3d. An Act supplemental to the before-mentioned act, approved March 8, 1867.

In obedience to the requirements of the first section of the act, the Governor appointed twenty-eight trustees, who, with the members *ex-officio*, thirty-two in all, met on Tuesday, the 12th day of March, 1867, in compliance with the law, and the summons of the Governor, and, after being solemnly sworn into office, proceeded in due form, to organize as "The Board of Trustees of the Illinois Industrial University."

Having thus briefly traced the history of this Institution from its dim foreshadowing in 1851, through the successive periods of its individual, organized, legislative, and congressional struggles, down to its formal organization, just one year ago, it is fit now to examine for a moment the essential nature and objects of the Institution which has thus been created. This I shall endeavor to do in the blended light both of law and of reason—of statutory provisions and common sense; for we cannot presume that these, in any of the acts concerned, are contrary the one to the other.

The act of Congress of July 2, 1862, is the fundamental law, the *magna charta* from which the whole system of Universities not only derives its life, but in which its essential objects are defined, and the sphere of its legitimate operations clearly and comprehensively marked out. To the provisions of that act we must therefore look, primarily, to ascertain the province within which this University may legally and appropriately act. And since each State, in accepting the proffered endowment, did so with a full knowledge of all its accompanying conditions, and a solemn covenant with the National Government to stand to, abide by, and in good faith carry them out, it might be safely presumed that the legislation of each State on the subject would be in strict accord with the fundamental law. And this, upon examination and comparison, we find to be the fact. Indeed, the language of the two acts in relation to the fundamental purpose and scope of the University, is nearly identical. In section four of the act of July 2, 1862, Congress declares that "the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life." While in section 7, of the act of February 28, 1867, our State Legislature declares that the Board of Trustees shall have power to do whatever "may be required to teach in the *most thorough manner* such branches of learning as are related to agriculture and the mechanic arts, and military tactics, without excluding other scientific and classical studies." The two sections are identical in meaning, upon these points, and nearly so in language—the only difference worthy of note being that

our State law emphasizes the broad terms of the Congressional act, by the significant phrase—"in the *most thorough manner.*"

The purposes for which this University was established, the work which it must do and may do, are here stated and defined, by the supreme and authoritative laws of Congress and of Illinois, in a manner so plain that only the most hopeless ignorance or willful perversity can misconstrue or misunderstand them.

It will be seen that the law in respect to the instruction to be given in the University is two-fold, *mandatory* and *permissive*—certain things must be taught, certain other things are *not excluded.* Respecting the latter the Trustees seem to have discretion; they may provide for them or not, as they see fit; in respect to the former, they have no choice or discretion whatevor, they must provide for them, or violate their oaths and the laws.

The departments of instruction for which the Trustees are positively and peremptorily required to provide, and that "in the most thorough manner," are two:

1. "Such branches of learning as are related to agriculture and the mechanic arts," and

2. "Military tactics."

Instruction in these is a *sine qua non*, a condition precedent, default in which would work the forfeiture of the endowment.

Those branches of learning which are "not excluded," and for which the Trustees *may*, therefore, provide, at their discretion, are embraced in the comprehensive phrase, "other scientific and classical studies."

The boundaries of the present inquiry are thus sharply defined, both inclusively and exclusively. If the Trustees have arranged a course of study embracing "such branches of learning as are related to agriculture and the mechanic arts," and also, "military tactics," they have strictly complied with the law; and if in addition to these they have also provided for *some* "other scientific and classical studies," they have therein done precisely what the law, in so many words, allows and empowers them to do. Indeed, a much stronger interpretation of the clause, "*without excluding* other scientific and classical studies," is held by many eminent lawyers and jurists to be legitimate, if not even obligatory. In their view it would be by no means an unwarrantable construction to regard the italicized words in the above quotation as but another form of *requirement*—as coupling the duty of not excluding certain studies, with that of including certain other studies, and embracing both alike in the positive injunctions of the statute. But while this view is not without much force, and is strennuously maintained by many, I have preferred to adopt the permissive or optional theory, because it is the one about which there cannot be the semblauce of cloud or doubt.

What then, are those "branches of learning which are related to agriculture and the mechanic arts," and which are necessary in order to teach the same "in the *most thorough manner?*"

The answer to this question involves answers to two others, viz: What *is* agriculture? What *are* the mechanic arts?

I shall not consume the precious time of this occasion by any attempt at mere definitions—to do so would be alike idle and unnecessary. Suffice it to say that no man can take the terms, elements and ideas commonly and necessarily embraced in any tolerably complete definitions of those words, and undertake to trace their logical and necessary connections and relations, without finding the courses of study prescribed by the Trustees in those *departments*, utterly exhausted long before even

the beginning of the end is reached. In comparison with the hights and depths of research and investigation—the immensities and infinitudes of thought and study into the realms of Nature, comprehended in "those branches of learning" which are closely and inseparably related to "agriculture and the mechanic arts"—in comparison with these, the scheme of study and culture proposed in this University, comprehensive and excellent as it is, seems meagre indeed.

Agriculture and the mechanic arts! Whither do they *not* reach? Into what corner of the physical universe do they not lead us? What law of the terrestrial, solar, or sidereal worlds, do they not lay under contribution? What principle of life, or growth, or matter, or force, is not grasped by their ubiquitous hands? It is no rhetorical extravagance, but an undoubted and easily demonstrated truth, that there is naught of material life, or form, or being, force or motion, in the heavens above, the earth beneath, or the waters under the earth, into which, and through which, and around which, the laws and principles of those two sciences, in their myriad ramifications, relations and dependencies, do not pour and penetrate with an all-pervading, divine universality, even as the atmospheric ocean envelops the globe.

The student of agricultural science encounters, at the very threshold of his investigations, problems among the nicest and most abstruse that can engage the scrutiny of the human intellect. He may indeed handle the implements of husbandry, and stir the clods of his ancestral acres, with as little sense of the tremendous forces and eternal harmonies that slumber beneath and about him, ready to spring into quick, responsive, co-operative action, re-enforcing and completing his labors—as the savage who stares at the rings of Saturn through a telescope has of the immutable laws and everlasting symphonies of the spheres.

But let him attempt to leave the beaten track—let him, leaving his mere handicraft, undertake to interrogate Nature herself—let him endeavor to "make two blades of grass grow where but one grew before"—let him try to improve the quality or increase the productiveness of his fruits and vegetables and soils and animals—let him essay to produce new varieties of trees, plants, or flowers—or to revitalize exhausted soils; or to reclaim barren and worthless lands; or to discover the hidden manna upon which each plant delights to feed, with its peculiar and almost spiritual affinities for certain elements of atmosphere and soil—let him try to add one new flush of beauty to the queenly rose, or a daintier aroma to its fragrance—or an additional tint to the brilliant verbena—or another grace to the bending beauty of the elm, or the dark majesty of the pine: let him attempt to do any one of these, or a thousand other similar things, and he finds himself at once confronted by the *jasper walls of science*, through not one of whose beautiful gates can he pass without the *countersign*, known only to the polished children of meditation and culture. He finds Nature a sealed book, her oracles dumb, and her shrines guarded by inexorable sentinels, who pitilessly reply to his entreaties: "*We know you not.*"

There is no recourse for him but to begin with the *a*, *b*, *c*, of scientific principles, and laboriously work his way up to the sun-lit hights of Universal truths, as all have done who have gone before; or dismiss forever his new-born inspirations, and be content merely to hold the plow and swing the scythe till he dies. He can no more deal with the profound questionings that assail him on every side, without a knowledge of the subtle principles and exact scientific facts and truths upon which the problems of animal and vegetable life and growth and change depend, than he can make a book without an alphabet, or a house without tools and materials. And if he is really intent upon being a thinker, as well as a plowman, an explorer of

truth as well as a sower of seed, a scientific agriculturist as well as a sturdy, practical farmer; it will not be long till he appreciates the utter absurdity of the popular outcry against the study of abstract principles and pure science. Here, as elsewhere, it will be found that there is nothing like a little wholesome experience to take the conceit out of a man—provided always that he has sense enough to know when that operation has actually been performed upon him—for incorrigible fools are not confined to the ranks of school-masters and theorists, as some affirm; there may be farmers, perchance, worthy to divide with them the honors!

Let the farmer who points to his own life-long and successful husbandry without the benefit of books and theories and so-called useless abstractions, as a justification of his contempt for the thorough and systematic training of youth for agricultural pursuits—let such an one be called upon to conduct any original investigation, to analyze a soil; detect the presence of the insidious foes to vegetable life which lurk in earth, air, water and food; in a word, to advance the boundaries of agricultural science in any direction, and he will invoke the aid of his boasted skill in mere handicraft, as vainly as the false prophets of old, in their utter helplessness, cried aloud to Baal to help them. The divine fire will only descend at the summons of the true Elijahs of science.

It is no disgrace to be ignorant of abstruse knowledge, or of the subtle laws which pervade the universe of matter, from the atom to the continent—such knowledge can never, perhaps, be the inheritance of all. But to deride the study of abstract laws and principles, while boasting of the success which those very investigations have alone made possible, is the opposite of reasonable or honorable; and if to derision be added active and wanton hostility, what was before only stupidity and folly, becomes a crime against the interests of humanity.

I have spoken of the debt which successful husbandry, viewed only as a practical manual art, owes to scientific thinkers and pure philosophy. Go to your model farmer of this class, and inspect his estates, his methods of tillage, his selections and preparations of soils, the manures and fertilizers he uses, the rotation of crops that he practices, the breeds of animals he prefers, and how he rears and nurtures them—look at his machines and tools and implements of all sorts; his barns and other out-houses, his fences, gates, wagons and carts; his orchards, gardens, hot-beds and green-houses—and see what you will find. The latest and best improvements will characterize his outfit and equipments in every department. He will not have an old and defective machine or implement upon his place at any price, if a new and better one can be had. Every new and successful method and invention is eagerly sought for and applied. And yet, too often, after this unconscious homage to science, he will join in the chorus of disparagement of those very studies to the products of which he owes all of his pre-eminence; and of the men, it may be, who seek to place these priceless treasures in the hands of the people. Oh, men of Illinois, these things ought not so to be.

Thought rules the world, doubt it or deny it who may, and it will continue to do so to the end of time. Each and all of those marvelous machines, whose fingers of wood and iron spare those of flesh and bone, are the offspring of science—born of the patient vigils of the student, begotton of those same despised abstractions which lead down to the solemn laboratories of nature, and upward to the high cabinet of heaven where the Supreme Architect of the Universe presides. Those amazing displays of productive energy, which have quadrupled the value of the estate, are but the grand victories of Agricultural *Chemistry*. Those lordly herds that

sweep down to greet you, seeming the very incarnation of health and power and beauty, and as unlike their lean, ungainly progenitors as Darwin's hideous antetypes of man are to the imperial Caucasian, are the magnificent result of the applied principles of Animal Physiology. Those new and gorgeous varieties of flowers and shrubs, native and exotic, and those reduplicated specimens of choice fruits and vegetables, which have quintupled the market value of that orchard, garden and conservatory, are as certainly the radiant children of Botany, through Hybridization, as the day is the child of sunrise. Those peculiar soils of which our model farmer is the fortunate possessor, and of which he is so justly proud, are the gift of ages and epochs of strange and grand mutations, the thrilling story of which can only be told by Geology. He knows how to protect his favorite grape, or pear, or plum, from the invisible parasite that had for years doomed it to blight and death; or his wheat from the ravages of the terrible midge; or other fruits and grains from the deadly invasions of countless armies of atomic Goths and Huns—but gives no thanks to Entomology, to which, re-enforced by the microscope, he owes his deliverance and his wealth.

It might also be shown that he is equally a pensioner upon the munificent bounty of many other disregarded or despised, but life-giving, treasure-discovering, and wealth-bestowing sciences—such as Mineralogy, Meteorology, Natural History, etc. But the field is too wide, and enough for our purpose has already been said in this direction.

If we turn now for a moment to the other great department of instruction for which provision is required to be made in this University, viz: Those branches of learning related to the "Mechanic Arts," we shall find the views already presented to be not only sustained, but if possible, still more strikingly illustrated and confirmed.

If the student of agricultural science can not advance without a systematic and thorough training in the principles of pure philosophy and abstract science, it is vain for him who would be master of the mechanic arts to hope to do so.

And here it may be properly remarked that I am not now considering these scientific studies as instruments of *mental discipline*, at all—with that subject, upon which so much, wise and *otherwise*, has been said and written of late, I have now no concern. My present purpose is to show the absolute necessity of the mastery of principles in order to the highest success in the practical industries of life—that the material elements and resources with which we have to deal, can not be utilized without them; that a great many practical problems can not be solved at all without them, while a still larger number can not be advantageously or economically solved without them.

The student of Mechanics finds himself environed at once by those absolute and immutable laws of matter, of motion and rest, of momentum and force, by which the whole stupendous fabric of the material universe is sustained, directed and controlled. Go where he will he can not escape their presence, their inexorable conditions, or their resistless power. From the shape of the tiniest cog in the wheels of a watch, to the configuration of the earth and planets—from the whirl of a child's top, to the sweep of Neptune through his illimitable orbit—from the force that moves the index of the torsion balance, to that which upheaves oceans and continents—in all things and everywhere he finds himself in the grasp of God's everlasting and uncompromising code of dynamics and statics. And he finds, too, that the rock-built buttresses upon which all these laws rest down eternally, are derived from the science of *Mathematics*—without which he can do nothing; with

which, in mechanical philosophy at least, he can do all things. Nor will a smattering of the rudiments, a little algebra and less geometry, avail, as many affect to believe—(for among the studies which it has become popular to decry as useless abstractions, nearly all of the pure mathematics, and many of the applied, are included) nothing short of the whole iron series, from arithmetic to the calculus, will or can unfetter the feet of progress in mechanical philosophy.

I know that many a young mechanic will repudiate all this as idle fancy, and for reasons similar to those given by the model farmer to whom allusion has been made —he has succeeded, he thinks, without this knowledge and culture. Yes, but I am not speaking of what he means by success. It is not merely or chiefly to teach the student to construct wheels, that this school is founded, but to enable him to know the *spirit that is within* the wheels—to put him in possession of the elements of universal success.

"The difficulty in positive rules prepared for uneducated men is, that they can never bend to circumstances; and the workmen go on in a fixed track, in cases where they might have changed it without a variation of principle, but with the greatest economy of time and money.

"The calculation of the strength and stress of timber, though very simple in itself, is notwithstanding, an analytical problem, which one unacquainted with algebra could not solve. In the construction of groined arches, the principles of descriptive geometry are equally applicable and necessary. The catenary and elliptical curves, which are their best form, can not be understood without the higher geometry. The arch can not be built without the greatest extravagance in the use of materials, unless the precise form of every stone is known before it is cut from the rock. If the quantity of timber, stone, and other material wasted in building, from the want of a very little knowledge of mathematics, could be calculated, I have no doubt its price would educate all the young mechanics of the land. *Science is economical*—it repays the people a hundred-fold for what is expended in its cultivation. The surveyor must have at least some knowledge of trigonometry. All the section lines in these Northwestern States are based upon meridian-lines, and these were fixed by the nicest mathematical and astronomical calculations. In hydraulics we find the principles of mathematics equally necessary. All the calculations of the velocity, power and quantity of moving fluids depend upon these principles. How can a millwright be master of his business without understanding them? The very shapes of the cogs in his wheels are determined by them. In the construction of canals, railroads, bridges, and in all the operations of civil engineering, mathematics are the essential element."

Let any young mechanic who has fallen under the delusion that he can make his way to the highest success without a thorough acquaintance with mathematics, try the experiment. He begins with the common mechanical powers. He takes a *Lever*, and understands that a weight will move it; but the principle upon which different weights, at different distances move, he knows not, for this depends upon *ratios* and *proportions*. He passes to the *Inclined Plane*, but quits it in disgust when he finds its action depends upon the relations of *angles* and *triangles*. The *Screw* is still worse; and when he comes to the *Wheel* and *Axle*, he gives them up—they are *all mathematical*. He would investigate the laws of falling bodies and moving fluids, but instantly roots, lines, squares, angles and curves float before him in the mazy dance of a disturbed intellect. The very first proposition is a mystery, and he soon discovers that mechanical philosophy is little better than mathematics itself.

But he still has his senses, and surely will not be indebted to diagrams and equations for their enjoyment. He gazes with admiration upon the phenomena of light; the rainbow upon the bosom of the clouds; the clouds themselves reflected from the surface of the waters. Whence this beautiful imagery? He soon finds that every hue in the rainbow is made by a different *angle of refraction;* that each ray from the mirror has its angle of incidence equal to its angle of reflection; and as he pursues the subject in the construction of lenses and telescopes, the whole family of triangles, ratios, proportions and conclusions arise to alarm his excited vision.

He turns to the Heavens, with its shining host, moving in solemn procession through the "Halls of the Sky," and would know the structure of this beautiful system, and the laws which regulate those distant lights. But *Astronomy* forever banishes him from her presence—she will have none near her to whom mathematics is not a familiar friend. What can *he* know of parallaxes, anomalies, and precessions, who has never studied the conic sections or the higher orders of analysis? She sends him to some wooden orrery, from which he may gather as much knowledge of the heavenly bodies as a child does of armies, from the gilded troopers of the toy shop.

But surely there *are* sciences which have better taste and less austerity of manners. He flies to *Chemistry*, and her gorgeous robes float loosely about him. For awhile he goes gloriously on, illuminated by the *red lights* and *blue lights* of crucibles and retorts. But soon he comes to compound bodies—to the composition of the elements around him, and finds them all in fixed relations—that gases and fluids will combine with each other and with solids only in a certain *ratio*, and that all possible compounds are formed by nature in *immutable proportions*. Then starts up the whole doctrine of chemical equivalents, and mathematics again stares him in the face.

Aghast, he flies to *Mineralogy;* stones he *may* pick up, jewels he may draw from the bosom of the earth, and be no longer alarmed at the stern visage of this terrible science; but even here he is not safe. He picks up a quartz, it contains a *crystal*, and that crystal takes the dreaded form of *Geometry*. Crystallization lures him on, but as he goes, cubes and hexagons, pyramids and dodecagons arise before him in splendid array. He would know more about them, but must *wait* at the portal of the temple, till introduced by that honored of time and science, our friendly Euclid.

And now, where shall this student of nature, without the aid of mathematics, go for his knowledge or his enjoyments? To Natural History? The very birds cleave the air in the form of the *cycloid*, and mathematics prove it the best. Their feathers are formed upon calculated mechanical principles; the muscles of their frames are moved by them—the little bee has constructed his cell in the very geometrical figure and with the precise angles which mathematicians, after ages of investigation, have demonstrated to be that which contains the greatest economy of space and strength.

In the realms of chaos there may perhaps be found some spot visited by no figure of geometry, and no harmony of proportion; but nature, this beautiful creation of God, has no resting place for him who would shun mathematics. All its construction is mathematical. It has no elements mixed without regulated law; no broken chord to make a false note in the music of the spheres. [E. D. Mansfield, in "American Education," pp. 124–127.]

The Illinois Industrial University is established in no spirit of rivalry, much less of hostility or antagonism, to the other Colleges and Universities of the country; nor in any spirit of disparagement or even criticism of their objects, management, courses of study or practical results. Nor was it in any manner or sense the intention of Congress, in the munificent endowment of these Universities, or of the State Legislatures in accepting the grant with its conditions, to undervalue or discriminate against the old order of liberal culture.

The American College system has an illustrious history, and sits crowned to-day with imperishable lustre and beauty. Beginning at a period coeval with that of the Republic itself, it has done a work of blessedness and power the magnitude of which can never be recorded. It gave us the common school, and, with the common school it has, beyond a doubt, also given us the Industrial University itself. It needs no eulogium: there stand Harvard, and Yale, and Dartmouth, and Brown, and Amherst, and Bowdoin, and Princeton, and Union, and their compeers in the North and West, and there I trust they will stand forever. Peerless mothers of the nation's intellectual *Gracchi*, whose names and deeds and genius are interwoven with all that is noblest and best in our history and achievements, well may they exclaim, "See, *these* are our jewels!"

What, then, is the grand distinguishing feature, purpose, hope, of this University?

In my view it is to form a closer alliance between Labor and Learning; between Science and the Manual Arts; between Man and Nature; between the Human Soul and God, as seen in and revealed through His works. It is to endeavor to so wed the intellect and heart of the students we educate, to the matchless attractions of rural and industrial life, that they will, with their whole soul, *prefer* and *choose* that life, and consecrate to it the resources of skill and culture and power that may here be gained. These I hold to be the aims and hopes of this University. And we hope to attain them, not by a less extensive and thorough course of instruction than is given in other Universities, but by a somewhat *different* course, and more especially by *emphasizing*, from the beginning to the end of it, those studies and sciences which look *away* from literary and professional life, and *towards* the pursuits of the agriculturist and the artisan—by holding the student to a closer *communion with Nature* in her forms of living grace and beauty; her protean changes; her sweet, profound and pure inspirations; and thus forming in his soul a purified *relish* for rural employments and pleasures, and a sincere longing for a life-long fellowship with them—by making as it were the very atmosphere of the University redolent of meadows and flowers, vocal with bird-notes and instinct with the love and spirit of the beautiful outer world—by demonstrating that the pursuits to which this Institution invites the young and ardent, are inferior in no element of dignity and honor to the so-called learned professions; requiring a scholarship no less varied and profound; equally fitting men for the most exalted positions in the State and Nation, while pointing to a life of purest enjoyments and sweetest tranquility—by proving, too, that in addition to these high advantages, the *rewards* of rural and mechanical industry, when vitalized by intelligence and re-enforced by the treasures of science, are equal to those of any other legitimate human vocation; and hence that none need turn from them in the hope of a speedier acquisition of wealth—and finally, by the sincere convictions and loving enthusiasm of the Regent and Instructors, inspiring and quickening all minds and hearts, and arousing that "*esprit du corps*," which is the precursor of success in every department of human activities.

These are some of the modes by which we hope and believe that the great ends of this University will not fail of achievement. We all know the peculiar and subtle power of a fore-known and determined purpose, a well-defined and publicly announced generic aim, to create an intellectual and moral *atmosphere* that *itself* leads, assists and educates in the desired direction. There are influences under which men unconsciously *gravitate* towards this or that pursuit, impelled thereto by a law of mental assimilation, whereby all things are made tributary to the dominant spirit of the place. At West Point *war* is the genius of the place, the objective point towards which every thing tends. Books, lectures, sciences, though in themselves the same there as elsewhere, all stand in some way connected, by this law of association, with military engineering, the movements of armies, or the conflicts of the battle-field. Because this is what West Point *is for*. No one can stay there long enough to catch the spirit of the place, without feeling that this is so.

In seminaries for clergymen, *theology* is the controlling theme, the centripetal force that reaches and modifies the whole life of the place, the currents of thought, the hopes and aspirations of the students.

Now a West Point Cadet is not *obliged* to assume, for life, the profession of arms, nor a student of theology to enter the sacred office; but all can see that each will be infinitely more *likely* to do so by reason of the peculiar purposes, affinities and surroundings of their respective places of culture; and that it is morally certain that *neither* will choose the profession of *the other*.

It is the powerful aid of this familiar principle, in connection with special courses of study, that is brought to bear and utilized by the establishment of separate Universities, the distinct and avowed object of which is to train young men for rural and mechanical pursuits. The exact sciences, and many other branches of learning taught here, are, of course, precisely the same, and taught in precisely the same manner, as at Yale, Dartmouth, or West Point—for all mathematics and pure philosophy belong to the realms of universal truth, which know no latitude or longitude, and which no institution, or class of institutions, or of men or professions, can exclusively appropriate, any more than light and air, fire and water, can be monopolized. But, under the influence of the spirit and tendencies here dominant, the culture and power *derived* from these studies will be *constantly deflected* from other pursuits, towards the grand aim of the University. The problems to which the principles of mathematics and other sciences will be most applied by our students, will be taken from the fields of investigation here most prominent—from the domain of agriculture and the mechanic arts—because these will here be the most familiar themes of thought and conversation—just as questions relating to the science of war are uppermost at the Military Academy, or those pertaining to christian philosophy and faith, at Princeton or Andover. The same laws of association and affinity will operate here as elsewhere. And this is a matter of the highest importance, for the one great practical question in these Institutions will be, how to hold the young men to the farm and the workshops, *after* they are educated.

There is one proposition of fundamental importance in this whole matter of industrial education: If the pursuits of agriculture and the mechanic arts are ever to take, in the estimation of men, the commanding position to which they are justly entitled, those who are educated for them must be *as thoroughly and completely educated*, as those who are trained for other pursuits and professions. I consider this truth, and the recognition of it, as absolutely vital to success. If a farmer or an

artisan is *as well educated* as a lawyer, a physician, or a senator—if he has, I mean, as much knowledge, as profound a mastery of scientific and philosophical principles, as much self-knowledge and self-dependence, as much varied attainment, as much *brain power*, *thought power*, and *heart power*, he will be the *peer* of the latter, in influence and honor and usefulness and force, anywhere and every where and always—but if not, he will be inferior to the other in power and influence, and no device, or pretense, or declamation, or protest, or sophistry can make it otherwise. The difference will exist precisely as long as the causes that produced it; it is simply the difference between weakness and strength. I have nothing whatever to do here with the means and instrumentalities of education, but only with the *fact*, the *product*, the *finished work* of culture. And I affirm again, that the cause, and the only cause, of the immensely superior power heretofore wielded in the affairs of men, by the professional classes over the industrial classes is, that the one have thus far been better educated than the other. And now, if these Universities of the people expect successfully to compete, in their appropriate spheres, with those which are already hoary with age and venerable with honors; which are completely equipped and manned, and impregnably intrenched among the very foundation stones of our whole educational and social system, and interwoven with all of our ideas of intellectual culture and progress as a nation—if this is expected, (and to expect less would be to invite contempt and defeat, at the outset), the one palpable, essential and indispensable condition is, that the education for which they provide must be *equal* in *all essential points*, in extent, in comprehensiveness, in thoroughness, and in inspiration and power, with that afforded by the old colleges and universities of the country. Our courses of study must be as broad; our apparatus, libraries, cabinets, and other auxiliaries and appliances, must be as ample and as good; our professors, lecturers, and teachers, must be as able and earnest, as learned, adapted, and devoted, as theirs.

With these conditions fulfilled, and super-added to the matchless value and beauty of the pursuits whose ranks we seek to fill, and with the benisons of waiting millions upon our efforts, and praying for our success, we shall not fail. But if we aim at anything less than this, failure is already inscribed upon these walls. In the language of another, such Industrial Universities as we have had, and as some people still talk about, mere elementary schools, where boys are sent to learn to work instead of to learn *to think*, "stand before the public mind, as contrasted with the compactly organized, and ubiquitous power and presence of older Institutions, much like an unarmed mob of a few hundred men, in presence of armed legions of veterans—or like a wheelbarrow along-side of a locomotive—or a scow along-side of a well-armed navy—a thing not to be resisted, or even competed with, but simply to be laughed at."

There are some errors and fallacies and lies about this matter of education, which have befooled and cursed mankind long enough; it is high time for them to die and be buried. One of them is the absurd and "contemptible idea that the highest degree of education cannot be employed in one calling as well as another"—that a few men, or classes of men, have a divine right to monopolize and devour all but the crumbs that fall from the groaning tables of science. To sweep such abominable falsehoods from the precincts of truth, and from the minds of the people, "rhetoric may well become a whirlwind, and logic fire."

If one proposing to himself the life of a farmer or a mechanic, or any other industrial pursuit, *wants* to study languages, ancient or modern, or metaphysics, or belles-

lettres, or *anything else* out of the direct line of preparation for his chosen employment, it is his right to do so, and the province of no man to say he should not, or to sneer at the idea that *he* can make use of such things. If he does *not* want them, he need not have them—no man, or institution, or system, or corporation on earth has the right to force them upon him. All that I claim is, that no institution can, with a decent regard to truth or sense, be called a *University*, which does not provide something more than merely special, or professional, courses; which does not place the amenities of literature, the treasures of intellectual and ethical philosophy, and the world's wealth of genius, art, and taste, within the reach of all *who choose to have them*. And I utterly deny that the industrial classes may of right be excluded from *any* department of learning to which any other class has access. "*Every* art and *every* science may conspire to increase the enjoyments and profits, and to confer dignity, grace, and honor upon the tiller of the soil. It is the *art of arts*, the *science of sciences*, where physical and intellectual capacity, judgment, taste and learning, may aid to produce the most triumphant success. I can conceive of no other life that, followed in its comprehensive spirit and grasp, calls into action more varied powers and acquisitions, or inspires more of the faculties and energies and ingenuities of man."

May the God of light and knowledge and love smile upon the transactions of this day—may He accept and bless the offering we here lay upon the altar of truth and liberty. We have waited long for this Institution and for this hour—both have come at last. With beaming garments and glorious prophecies of good to all the people of this Commonwealth, the Illinois Industrial University, escorted and upborne, I trust, by the heartiest benedictions of all, to-day moves grandly to the front, and assumes her position at the head of the imperial line of forces by which the State would draw the whole people up to light and knowledge. Well may every mind be impressed as we stand at the head-springs of this new fountain, and pray that its streams may be *pure*, *copious* and *perennial*.

My memory as an Illinoisan ante-dates the free school, the railroad, the canal, the city, all that constitutes the glory and hope of the Illinois of to-day. First pressing the soil of the State when Chicago numbered less than one hundred souls; when all this region, for leagues in every direction, was a silent wilderness, and St. Louis, then an inconsiderable village, was our nearest market and only source of supplies; having devoted my whole life to educational work, and organized, in the midst of opposition and doubt, the first free school ever established in the State—it would be strange if *I* could stand here this day, without emotion—a day so full of crowding memories of the past, of thankful joy for the present, and thrilling visions of the future.

Thank God, monopolies of learning, by privileged classes, are among the discrowned shadows of the past. A new element is henceforth to bear sway in the destinies of these States and of the nation. To the dust must go, and will go, whatever schemes, devices or systems, refuse to affiliate with or set themselves in opposition to, the Lord's redeemed and annointed—the *People*. This is the sublime spirit of the age, and its victories will be brighter and grander, as the generations come and go.

I believe this University is founded in, and pervaded by, this spirit, and that it therefore has a great work to do—a work full of beauty and glory, of beneficence and power. But it is not for a sect, or class, or clan. The people have borne the proscription through historic ages, and an end has come. Henceforth the inscrip-

tion upon the temples of highest learning, as well as of the common school, is to be: "*Whosoever will*, let him come." Let this University catch here, and feel forever, the inspiration of this ennobling conception of the surely coming American democracy—let it join with the ten thousand public schools of the State, and with the ten times ten thousand public schools of the Union, in voicing down to coming generations the incarnate truth of the age and of God, that culture, as well as liberty, is the everlasting heritage of the race, and that whoso would restrict to the few what belongs to all, is a traitor to the people. Glory be to God in the highest, and on earth, peace, good will to men.

The following original ode, written by a lady, was then sung by the choir and audience:

God of wisdom! with thy favor,
  Bless this fane, by human hand
Reared to Science, Art, Industry,
  For the sons of our great land.

Thanks we give for institutions
  Shedding light, benign and strong,
Beaming forth like suns, dispelling
  Mists of ignorance and wrong.

Bless this sun, in hope arising,
  O'er the plains of Illinois;
Arm its splendors with thy power,
  Make its fame our pride and joy.

Clear and bright, for aye, its shining,
  Far and wide its beams extend,
Making love of useful labor
  With the love of learning blend.

Give to science grander power
  Truth from every field to glean;
Till its light and warmth and beauty
  O'er the earth are felt and seen.

General S. A. Hurlbut, on behalf of the Board of Trustees, and in the absence of the Governor, presented the keys of the University to the Regent. He said, that, as one who had some responsibility for the location, he had come innocently to take part in the general rejoicing; but, having fallen into the hands of the Trustees, he had been sandwiched between two good addresses to fill the place of the Governor, who should have made the presentation, and whose absence all regretted. One idea he would like to enforce. The American Republic rested on the education of all. It was its theory and salvation. Every man in it belonged to the governing class. The education of the loyal people saved the Republic. By their duty to their country, and in memory of what they had suffered, they should join in welcoming with glad

lettres, or *anything else* out of the direct line of preparation for his chosen employment, it is his right to do so, and the province of no man to say he should not, or to sneer at the idea that *he* can make use of such things. If he does *not* want them, he need not have them—no man, or institution, or system, or corporation on earth has the right to force them upon him. All that I claim is, that no institution can, with a decent regard to truth or sense, be called a *University*, which does not provide something more than merely special, or professional, courses; which does not place the amenities of literature, the treasures of intellectual and ethical philosophy, and the world's wealth of genius, art, and taste, within the reach of all *who choose to have them.* And I utterly deny that the industrial classes may of right be excluded from *any* department of learning to which any other class has access. "*Every* art and *every* science may conspire to increase the enjoyments and profits, and to confer dignity, grace, and honor upon the tiller of the soil. It is the *art of arts*, the *science of sciences*, where physical and intellectual capacity, judgment, taste and learning, may aid to produce the most triumphant success. I can conceive of no other life that, followed in its comprehensive spirit and grasp, calls into action more varied powers and acquisitions, or inspires more of the faculties and energies and ingenuities of man."

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Till its light and warmth and beauty
  O'er the earth are felt and seen.

General S. A. Hurlbut, on behalf of the Board of Trustees, and in the absence of the Governor, presented the keys of the University to the Regent. He said, that, as one who had some responsibility for the location, he had come innocently to take part in the general rejoicing; but, having fallen into the hands of the Trustees, he had been sandwiched between two good addresses to fill the place of the Governor, who should have made the presentation, and whose absence all regretted. One idea he would like to enforce. The American Republic rested on the education of all. It was its theory and salvation. Every man in it belonged to the governing class. The education of the loyal people saved the Republic. By their duty to their country, and in memory of what they had suffered, they should join in welcoming with glad

shouts the incoming of the new day, when every man, everywhere, could seek just the sort of education he required.

Then, addressing Dr. Gregory, he said that no grander scheme of education had ever been inaugurated, than that of to day. He was sure that he would be found equal to the responsibility, and resting assured of that, would present him, on behalf of the State, with the symbols of authority.

JOHN M. GREGORY, LL. D., Regent of the University, then delivered the

INAUGURAL ADDRESS.

Gentlemen of the Board of Trustees, and Fellow Citizens of Illinois:

I should be something more or less than human not to feel the solemn pressure of this hour. From the outset, I comprehended both the greatness and the difficulty of the undertaking in which we are engaged. But, neither ought the greatness to appal, nor the difficulties to discourage us. Let them, rather, inspire to a nobler ardor, and urge to wiser and more determined efforts. The great enterprises of human civilization are not carried forward to their triumphant end by the play of children. They at once rouse and require the full-grown energies of strong men.

It is no ordinary work which we are set to do, and it comes to us under no ordinary conditions. We are not here to reproduce, in this new locality, some old and well known style of college or university. Nor are we permitted to sit down in quiet to invent, at our leisure, some new scheme of education, which, when settled to our own tastes, we may offer for public patronage, as a manufacturer offers a new fashioned piano or plough. No such easy task of leisure hours is allowed us. Hosts of earnest men are impatiently waiting to see how we will meet the great duty which the country has entrusted to us. The veteran advocates of industrial education are ready to scan, with keen vision, both our plans and our performances. The hungry eyes of toiling millions are turned, with mingled hope and fear, upon us, to see what new and better solution we can possibly offer of the great problems on which their well-being and destiny depend. We have good need to act wisely as well as earnestly, in the presence of this great host of interested spectators.

But it is not merely the voice of our fellow citizens which has called us to this work. The Age itself, invites us. Slowly, a great want has struggled into definite shape in the hearts of mankind. The demand has arisen for deliverance from the evils of ignorance and for a more fit and practical education for the industrial classes. It is labor lifting its Ajax cry for light to guide its toil, and illuminate its life. Daily the feeling grows stronger, that the old courses of classical study do not meet the new and increasing wants of the working world. The industries are steadily and rapidly becoming more scientific. They are no longer the rude, manual arts of the olden times. They have brought the mighty powers of nature to their aid, and seek to conform their labors to the great laws of matter and life. Agriculturist and artisan find themselves working amid great and significant phenomena, which only science can explain; and they have caught glimpses of possible triumphs in their arts which they may win, if they can be educated to the mastery of better processes and more scientific combinations. Hence the cry for the liberal education of the industrial classes. This demand, as we have heard to-day, (see Dr. Bateman's address) was rung by the eloquent voice of Prof. Turner and his colleagues throughout this State. I remember to have heard it echoing over the border, in a neighboring State. Agricultural Colleges, People's Colleges and Polytechnic Schools have sprung into existence in answer to this popular want, and even the old colleges

have yielded so far to the pressure as to admit scientific courses of study. The demand at length, made itself heard in the halls of Congress, and gained from the national representatives a munificent grant of public lands to found colleges for the industrial classes. A new era dawned. New institutions were to be organized, devoted to the industries, and having for their chief object, "the liberal and practical education of the industrial classes." The eyes of the nation have been turned towards the rising light, and vague, but mighty, hopes have gathered in the public mind. To us it is committed, here in Illinois, to realize these hopes. Rarely has a grander duty, nor, perhaps, a more difficult one, fallen to the lot of any body of men. We are the servitors of the age itself.

The great movements of the world are not the results of agitation; the agitation is, rather, the effect and evidence of the rising movement. Not the invention of any reformer, but the logical outcome of the progress of science and art, is this new demand for a higher and better education of the industrial classes. The rising light of a new era of science has stolen over the world. A wakeful few, standing on some favored eminence, caught, before their fellows, the illuminating rays, but no human hand could much hasten its dawning, nor hinder its progress. The earth itself, obedient to the celestial attractions, was slowly, but steadily and with resistless force, rolling its inhabitants into the light. Sleepy eyes may refuse to see it, or fogy stupidity may obscure its progress, but the day never goes backward. The sun of the new era will rise to the zenith. Its light and heat will re-vitalize the world. The institutions which it brings forth will live and flourish in spite of all storms which may greet their birth or oppose their beginnings. The great demand which created them will insure their continuance, and urge them forward to their triumph. Should they fail, at first, the public voice will demand *reconstruction*, not destruction. The people, once aroused, will not endure to be cheated of their hopes. Industrial education—education devoted to the improvement of the great industries of the world, and to the enlightenment of the industrial classes, which is, in its fullest and best sense, the education of the people—this is the logical end to which all popular movement marches. Thus, gentlemen, we ride the crest of a great tidal wave of popular want and popular will, and this wave must bear us resistlessly forward to our destiny and our crown.

Let me not, in this, be the least unjust to other and older institutions of learning. They, too, have felt, deep within their venerable halls, the rising pressure of this popular want, and they are responding to its cry, by attempting such modifications in their courses of study as may adapt them to meet the wants of practical men. It has become fashionable for men to decry the old colleges, as though they were wholly antiquated and useless in this swift and practical age, but no true men will thus decry them. All over the land, their graduates lead the van in the struggle to elevate and bless the race of man. In the war for the Union, their professors and students enlisted among the earliest and fought with the bravest for the salvation of their country. Even this movement for industrial education found its earliest, strongest and most ardent advocates among the men who had been trained to think and speak at the old altars of learning, and the movement would never have come to this hour but for the able advocacy and the determined efforts of men whom these very colleges reared up to power. We do not need to tear down others in order that we may take their places. Let these grand old institutions still go on with their work. Humanity owes them a great debt of gratitude for the light of learning shed by them o'er the homes and walks of men. But it is ours to organize a University wholly on this new and grand idea of education devoted to the practical industries of the world.

But though this University is thus the child of a great popular movement and is borne forward by the very tide of popular progress, it is not wholly without difficulties and dangers. Nay, let us not shut our eyes to the fact, more than ordinary perils surround it and obstacles of unwonted magnitude lie on its path. The very might of that great popular movement which bears us forward, threatens us always with catastrophe. He who navigates a torrent, will find abundant perils, however rapidly it may carry him on

to his purposed end. It is no unfit service, and certainly is a prudent one, for this opening hour of the public career of the University, to note some of the chief difficulties which lie in its way. Caution will arm itself with new prudence, and courage will rise to a loftier energy and determination, from a nearer and clearer view of the obstacles to be encountered and overcome. And, perhaps, thoughtless and impatient criticism may abate some of its arrogance, and captious fault finding, when it sees how beset with difficulties is your way, as Trustees, and how mighty is the problem with which you are called to grapple.

The difficulties which lie in the way of a successful inauguration and operation of an Industrial University are chiefly of two classes:

1st. Those which are found in the internal organization and working of the institution; and,

2d. Those which lie in its external relations and surroundings.

Those of the first class consist mainly in the difficulty of combining the theoretical and the practical in education, and in the further difficulty of uniting the several departments of practical instruction in the same institution. These difficulties are much greater than a casual or careless observer will suspect.

To secure a familiar knowledge and mastery of the sciences is a work both toilsome and time-consuming. To accomplish this in the weakness and imperfection of youth necessarily so absorbs the strength and occupies the time, that the most practical teacher is puzzled to find leisure, either for himself or his pupils, sufficient to allow him to train them in those quick and accurate perceptions, those prompt and familiar judgments, and that ready and skillful grasp and mastery of facts, formulas and forces which the practical applications of the sciences require. It is comparatively easy to load the youthful memory with the knowledge which has been wrought out by other minds, and to send our students forth to the encounters of life burdened, rather than armed, with the ponderous armor of some Saul of science. Education, under careless or unskillful teachers, always tends strongly towards this excessive use of mere verbal memory. It is much easier to learn and remember, than to investigate and think. But to link the scholarly study of truths and theories, the reasoning upon general laws, and the comprehension of sciences, in their completeness, with a practical mastery of their applications in the arts, is a work of double difficulty. Shall we simply teach the sciences without attempting to teach their practical applications, then we fall again into the error of the old schoolmen. Our science will be bookish learning. We have failed to forge the golden fetter which binds learning to labor. The industries will look in vain for skilled leaders from among our graduates. Shall we neglect all of science except its results, and grasping these by mere force of memory, give our whole attention to the processes of art? What is this more than the old apprenticeship? For science thus learned neither educates nor enlightens. Its possession would be an evanescent dream, and its influence a mere passing shadow.

Our problem requires us to unite scientific and art education—to make true scholars, while we make practical artisans, and to do this, not in one or two arts, but in the whole round of human industries.

But, great as are these internal difficulties, they are not insuperable. They may be met by a due union of patience and power. All the practical arts rest down on the great natural sciences, and every process of art is a scientific experiment. What we have to do is to combine, in some central and fundamental course of liberal education, these sciences in such measure and position that they may properly synchronize with and support the several art studies. And such is our plan. Our course in "Science, Literature and Art," is richly charged with the knowledges which underlie all the industrial arts, and these are so placed that all the special courses of instruction may grow from the central course, as branches grow from a supporting and nourishing trunk. We shall thus educate and teach at the same time. While we develop, we shall also direct; and the applications of science will help to give zest and power to the study of science.

The propriety and utility of an educational course in an institution designed to teach the practical arts has been severely questioned. As well question the value of the trunk and roots to the tree. It is the branches, indeed, that bear the desired fruit, but branches and fruit must alike wither if the trunk be girdled or the roots decay. Our only hope for a successful solution of our problem lies in this possible union of sound education and the practical study of the arts. To make educated farmers and mechanics, we must both educate and teach farming and mechanics. Let either factor be wanting and the product will never be attained.

But it is to the external difficulties which surround our work that I wish to give the chief consideration of this hour. These difficulties lie mainly in the crude, vague, and often contradictory and impracticable opinions which occupy, to some extent, the public mind in regard to these industrial schools.

In a country like ours, where the people are the repositories of power, and where the will of the people is the real constitution of the State, where the public opinion is so often the standard of right, and where the popular feeling is the "power behind the throne" to which all rulers and institutions must alike bow, the public approval is the guerdon of success, and the prevalence of hostile or even of dissentient opinions becomes a real, if not an insuperable obstacle to the triumph of new plans. The vague and unconsidered judgment which simply criticises and objects is often as fatal as the settled and intelligent opposing convictions of those who hold another theory, especially in matters in which the public mind has not been fully enlightened.

The Industrial University is peculiarly a child of the popular will. Designed to promote, by education, the industrial interests of the largest classes of the people, and challenging, on this very ground, popular sympathy and support, it is on these accounts more liable to be affected by the fluctuations of public sentiment regarding it than institutions of a less popular constitution. A thousand noble but vague hopes and aspirations will look here to find the help they crave; a thousand deeply felt needs of skill or power will turn to this University for their supply without knowing precisely how it is to be gained. Evils long endured will send up here their appeal for remedies. Fierce resentments against old wrongs or fancied wrongs, and still fiercer resolves in favor of cherished reforms or fancied reforms, will demand that these halls shall feed their hate or battle in their cause. Urged by such a variety of motives, and viewing the matter from such a diversity of standpoints, it will not be wonderful if an almost endless variety of plans shall be presented for our guidance.

Each theorizer will have some one or more favorite notions concerning education, and each will count his notion as of central value and importance, and will demand that the University shall be constructed on his idea as its chief corner stone. Unfortunately only one plan can be adopted, and its adoption will be the signal for a hundred men, of dogmatic turn, to shout that "a great mistake has been made." "The institution has failed of its great aim and purpose, and nothing but disaster can be expected till revolution shall come to right the wrong." The "mistake" is simply the failure to take their advice. The "purpose" lost sight of is their purpose, and the "disaster" is the loss of their approbation and patronage. They never seem to reflect that the adoption of their plans would have equally disappointed many others, perhaps, whose interest in the enterprise is equally great, and whose knowledge of its conditions may possibly be vastly greater.

This difficulty of conflicting views is one which is confined mainly to the outset of the enterprise. The success of the plans adopted will soon justify the wisdom of the Trustees, if it does not convert all friends of the University to their opinion. Success is its own argument and ends all debate.

A brief notice of two or three of the popular fallacies concerning these industrial schools founded by Congress, may help to enlighten honest inquiry, and to remove more speedily, hurtful errors.

1st. It is assumed by some that these institutions are specially designed for the education of the children of the industrial classes—the sons of farmers, mechanics, etc. If these sons are designing to follow the business of their fathers, then this conception is true; but if the farmer's sons are fitting themselves for doctors or lawyers, as is often their choice, then the University is not especially designed for them. If, on the other hand, the son of the lawyer, merchant, or preacher aims to become a scientific farmer, fruit-grower or mechanician, he will find here the precise instruction he needs. The University looks not to the parentage but to the purposed pursuits of its students. Its doors are open, indeed, to all, and the education it offers will be valuable in any pursuit or profession; but its great purpose is to give educated men to the industries.

Some have added to this mistake the notion that, since the University is designed, as they assume, to provide education for the farmer's children from the rural districts, it should give them the mere high school instruction which their district schools fail to give at home. I have been astonished to learn that one of the ablest and most prominent advocates of industrial education takes this view, and severely criticises the proposed courses of instruction because they do not come down to the capacity of common school children. Does he not see that public high schools are already provided in every county and in every village, even, at which these boys from the rural districts can find instruction of this sort much more conveniently and at much cheaper rates than the University can afford it? And does he not reflect that if the University should exhaust its teaching force in the attempt to provide instruction of this sort, it would prove but as a drop in the bucket for the hosts of this class, and that, while doing this, it must almost utterly fail to do the higher work required of it? Instead of a University devoted to the broad industries of a great State, it would become a mere academy or high school for one or two of the nearest counties.

2d. The more common and more troublesome forms of false opinion are those which relate to "practical education." The age is intensely practical. Its great triumphs in the practical arts have filled all minds and fired all imaginations. It scouts all knowledge and every form of education which does not promise immediate practical results. With Carlyle, it shouts, "the truth which holds good in working, cleave thou to that! All nature says, 'Yea, to that.'" Men, accustomed to quick and striking results, have grown impatient of the long periods of seed sowing and culture necessary to bring great mental harvests to ripeness.

And, certainly, when we remember the ages of wild and unproductive theorizings—the centuries which the intellect spent in dreams without results—we may well excuse the earnestness of the demand for practical tests of utility, and practical fruits of science. Not one whit too soon has this cry arisen, and none too earnestly is it pressed. The science which sheds no light on human pursuits, and the education which fits man for none of the great duties of his life are scarcely worth the attention of earnest men. The world has seen enough of the mere book learning which left the mind without power and the hand without skill. The age is too earnest, and the work men have to do is too real for such education as that which the old schoolmen gave their disciples. But what is practical? By what test shall we try it? To what products must it minister? Let us look more narrowly at these questions.

There are three great spheres of human industry:

First.—There is the work of the Discoverer. It is his to withdraw himself from active pursuits and to give himself to a close and patient study of the phenomena of nature. By powerful and searching analysis he penetrates to the bottom and roots of nature's facts; by high and sustained reflection he mounts to the summit and compass of her great kingdoms, and lays his grasp, at length, upon her statute books of universal and unchanging laws. He seizes upon the long coveted secret of her works and, like Prometheus of old, brings the stolen spark of celestial fire down to earth to warm and light the homes of men. Thus Newton discovered the law of gravitation; Galvani, the force we call galvanism; Harvey, the circulation of the blood; Cuvier, the types in the animal

kingdom; Franklin, the fact of aerial electricity; and Liebig, the chemical values of food. And thus many others are annually pressing into the great storehouses of nature's secrets, and bringing out its treasures to the aid of human arts.

The *second* sphere of industry is that of the Inventors. These workers take the great natural law, fact or force, revealed by the toil of the discoverer, and harness it into some labor saving machine, or deduce from it some new process of production. More numerous than the workers of the first class, these inventors are filling the world with their triumphs of art. The steamship, the sewing machine, the reaper and mower, and all the ten thousand implements and processes of useful art are the results of their toil. Often the discoverer is also an inventor, and not unfrequently the inventor has to take up the work of discovery, and develop or demonstrate the principle on which his machinery depends; but the two spheres must still remain forever distinct industries.

After the discoverers and inventors come the third great class of workers, the millions who, with stout hands and brave hearts, fill all the fields of productive toil with their practical power and skill. It is under their touch the soil yields its harvests, cities grow, shop and manufactory teem with rich products, commerce freights its ships and loads its cars, and world-transforming art puts forth all its power.

Now, of these three, which is the practical? or, rather, which is not practical? Without the Discoverer's work the Inventor would grope in darkness. Annually, hundreds of ingenious contrivances prove useless, because the law or principle they involve is misunderstood; and so art stands baffled at many a point waiting for the progress of scientific discovery to reveal some new and needed principle or force. And labor, stripped of the aids that invention has given it, would lose all its grand and wealth-producing power. The laborer would sink back into the ill-paid, ill-fed drudge of the barbarian age. To pronounce, then, that alone practical which lies next the last product, and which results in some material fruit, is to commit the blindest of follies. As well count the hand as the only practical member of the body, and cut off the head as a mere idle dreamer in the physical household.

Let us advance to a still higher stand and take a yet broader view of human effort. Besides the workers in physical things, there are those who work in the great realms of social and spiritual life—who culture the soul to higher power and arm it with finer sentiments, nobler purposes or higher and stronger resolves; who add to life new joys, to society new blessedness, and new values to all the forms of material wealth. Are not these, also, practical? Are not ideas possessions, as well as corn fields? Is not beauty a marketable quality, even in a horse? Is not the power to enjoy property as essential as the power to produce it? And is not an increase of motive power an essential condition to the increase of industry?

We repeat, then, to those who are so earnestly demanding that education shall be made practical, What is practical? Let us answer. Brains are practical. The most practical thing on earth is brain power—the power to see, reason and understand. In shop and field, in day labor or driving oxen, brain is better than brute force. As some writer has said, "brains are the best manure ever put on land." In peace or war it is not the heaviest battalions but the heaviest brains that win. And so that education is most practical which most develops brain power—power to perceive, judge and act.

It is true that knowledge is useful, and some knowledge is much more useful than others. If one desires to fish, it is desirable to know how to bait a hook. The knowledge of navigation is of great value to him who wishes to sail the seas. If it were possible to confine our sons to some one place and employment for life, then it might be practicable to select for them a course of the most useful knowledge. But life is so free in its movements, the avenues to business are so open and attractive, that no one can predict the career of a single youth. Trained as a physician, he becomes a farmer, an editor, a schoolmaster, and a Congressman, by turns. Oscillating from wealth to poverty and from poverty to wealth, he leaves his smoking firesides in a dozen States to mark his migrations across the continent. Even if he adheres to agriculture, how wide the diver-

sity of departments in which he may successively engage. Who then can foretell w knowledges he may require to guide him, and what will prove useless to him.

We do not mean to deny all differences in the practical values of knowledge, but count that the most valuable which most stimulates and exercises the intellect. Gen principles are of more value than particular facts, and knowledge knit to practical ap cations arouses and interests more than analytical statements.

The main difficulty, however, which assails the University from this direction is demand that one or another theorist will make, that studies which are favorites with shall be admitted to prominent place, and studies which they dislike shall be scor It is fashionable with such men, in this age, to scoff at all linguistic studies, save very simple study of the mother tongue. All attention given to foreign languages, especially to ancient languages, is a waste of time. They would have our youths st things and facts, not mere words, forgetting that the mind admits nothing within it ideas, and that words may express ideas as well, and often more clearly than thin and forgetting, likewise, that, while the study of things may train the eye to percepti the study of words is necessary to train the tongue to expression; and, finally, that l guages and books must forever remain to us the chief avenue of knowledge, that in th art and science are constantly repositing and putting forth all their treasures of fact thought.

But a more serious objection lies against these sticklers for their so-called use knowledges. They are not the only parties to be consulted in the case. The young m who come here for education will have opinions of their own as to what they wish to stu Many of them will be men grown, and the youngest will have reached that period opening manhood when the shadows of coming destinies and duties will have fallen up them; and they will have begun to cherish aspirations and aims for themselves and value studies in proportion as they regard them useful to their purposes. By what rig shall any of us step in between these young men and their choice and say to them y shall not study this, or, you shall study that. The homely old saw might be found t here, "One man can lead a horse to the pond, but ten men can not make him drin While we justly revolt against the old tyranny which compelled every seeker of libe learning to study the classics, let us not establish a counter tyranny to decree that one shall study the classics. Let our University offer to the ardent and aspiring you men of the State a full table spread with every form of human knowledge, and bid th freely to the feast. Courses of studies should be offered but as hints and guides to t undecided and inexperienced. The student who has clearly discerned his wants, a settled his course, ought to be left free to pursue his own chosen paths of learning.

And the success of our special courses will be best secured by such a plan. Years m elapse before the love of agriculture and other arts, or the faith in agricultural scie will induce any large number of earnest and aspiring young men to resort hither for t purpose of studying for industrial pursuits, but let us open freely to them all the fo tains of learning, and we may tinge these fountains as we will with industrial science sentiments.

And it is but just to agriculture itself and to the industrial arts, that their stud should be aided by all that refines or strengthens the mind, and that their educa representatives shall be the peers of the most soundly cultured men, in the scope value of their learning. We have an ambition to send forth to the great industri the world, not men who are puffed up by some little smatterings of science, but cl headed, broad-breasted scholars, men of fully developed minds—fit leaders of those gr productive arts by which the world's civilization is fed and furnished.

Time forbids the mention of all the forms of false opinion which lie across the path our progress. Our best answer to them will be our success in the plans we have adopt If these succeed, no opposition can harm us. If we fail, no silence of enemy or critic help us.

Nor shall I detain you to notice now all the hindrances from popular zeal, which will demand fruit ere our tree can be grown; or popular distrust, which will ask us to prove our power before it will allow us any of its sons to educate; from partisan or sectarian hostility or prejudices; from the old-time pride which will recoil from the very name of an industrial school; and from the apathy which applauds but continues to neglect what it applauds. If our difficulties are confessedly great, our triumphs, when won, will be correspondingly great and momentous. A brief glance at the results which must follow our success will help to arm us for the fray and inspire us for our task.

1st. We shall effect the more formal and more perfect union of labor and learning. These two will be married in indissoluble bonds at our altars. The skilled hand and the thinking brain will be found compatible members of the same body. Science, leaving its seat in the clouds and coming down to work with men in shop and field, will find not only a new stimulus for its studies, but better and clearer light for its investigations and surer tests for its truths. And labor, grown scientific, will mount to richer products as well as easier processes. Thus, these two, Thought and Work, which God designed to go together, will no longer remain assunder.

2d. Labor itself will be elevated to honor. Lifted from under degradation and redeemed from unnecessary drudgery; lighted by science to its useful triumphs, and grown artistic in its tastes and power, it will no longer remain the mere mindless forth-putting of muscular movement, but mount to the higher ideal of human activities, over-mastering brute matter, and compelling it to give up of its beauty, uses and strength for the comfort of the family of man.

3d. Labor will be made more productive. Not only will learning aid it to new inventions and teach it more productive processes, but educated leaders of labor will go forth from these halls to organize its scattered and wasted forces, and to teach it the great secret of co-operative power. And thus, though we can educate but a few of the great numbers of the industrial class, these few will scatter the benefits of the University to all. The West Point for the working world, its trained cadets will lead the bannered march of the millions as they climb the ascents of honor, wealth and higher life. The hard and unskillful toil of the world is thrice as much as is needed to produce its present results. Give this toil fit leaders and guides, and it may be greatly diminished in amount and yet doubled in product.

4th. Our national power and perpetuity will be greatly promoted. How often in the late war were we told that, "in national conflicts, the longest purse wins." And certainly that nation will be richest which has the most of skilled labor among its people. The toil of the ignorant slave is as poor in product as in price.

But the influence of educated labor on the perpetuity of national life may not be so obvious. History shows that the sure sign of national decadence and the certain prelude to national destruction is the growth of a spirit of idleness and luxury which relegates its labor to slaves and hirelings, and learns too late that muscular decay is the sure forerunner to mental imbecility. Nor need we go to effete or extinct nations to learn this serious truth. Among ourselves there is a constant revolution in progress. Individuals and families, energized and enriched by toil, are steadily rising from the lower ranks of society to take the place of those whose active brains, having exhausted the unrenewed muscular vigor of the stock, sink into effeminacy and so go down again to the bottom. "In the sweat of thy face shalt thou eat thy bread," is as true of nations as of individuals, and the nation that permits the industries to fall into contempt is next door to the ruin it deserves. A nobler and stronger nation will soon come to claim its place.

5th. But there remains a grander and broader triumph than all these. If we succeed, we shall demonstrate the practicability and point out the path of universal education. By the stern necessities of life, the great majorities of mankind must forever be found among the industrial classes. These constitute the great army corps—the heavy columns—the millions of the race. If now, labor is necessarily a drudgery and a degradation, it, as some economists of a Satanic school have affirmed, the elevation and ennobling of a

few will be at the expense of the many who must be content to remain in humble subordination, then the education of the masses is an idle dream. For to teach them simply to read and write is not education. Those whom labor perpetually degrades, learning can never successfully lift up. Our schools can only now and then stimulate one to escape at once from ignorance and from industry that he may attain education and idleness. "These must have perished, or I myself must have been lost," said an old Greek philosopher, as he gazed upon the ruined fields which he had neglected for the sake of his mind. "I myself am saved, and, therefore, these can not perish," will be the reply of the educated farmer. Let us but demonstrate that the highest culture is compatible with the active pursuit of industry, and that the richest learning will pay in a corn field or a carpenter's shop, and we have made universal education not only a possible possession, but a fated necessity of the race. Prove that education, in its highest form, will "pay" and you have made for it the market of the world. The light which has heretofore fallen through occasional rifts, and on scatterred hill tops, will henceforward flood field and valley with the splendors of a noontime sun, and the quickened intellect of the race will bloom with new beauty and burst into a richer fruitage of industrial arts.

Such, gentlemen, are the prospects that should cheer us. Such are the ends for which we labor. Let the University you to-day inaugurate but fulfill its office, and the State itself will feel the benign influence of its work.

The choir and the audience then joined in singing "America," and the Rev. Mr. Riley, of Urbana, pronounced the benediction.

After the close of the exercises most of the audience repaired to the University dining hall below, where a plentiful and elegant repast had been provided by the ladies of Champaign and Urbana. The dinner was succeeded by toasts, sentiments and speeches, and the assemblage dispersed in great good humor.

CIRCULAR AND CATALOGUE

OF THE

OFFICERS AND STUDENTS

OF THE

ILLINOIS INDUSTRIAL UNIVERSITY,

URBANA, CHAMPAIGN COUNTY.

ILLINOIS INDUSTRIAL UNIVERSITY.

THE ILLINOIS INDUSTRIAL UNIVERSITY is located between the contiguous cities of Urbana and Champaign, Champaign County, Illinois, 128 miles from Chicago, on the Chicago branch of the Illinois Central Railroad.

It was first opened for the reception of students on Monday, the 2d day of March, 1868.

The Industrial University was founded by an act of the Legislature, approved February 28, 1867, and endowed by the Congressional grant of *four hundred and eighty thousand* acres of land scrip, under the law providing for Agricultural Colleges. It was further enriched by the donation of Champaign county, of farms, buildings, and bonds, valued at $400,000.

The main University building is of brick, one hundred and twenty-five feet in length, and five stories in height. Its public rooms are sufficient for the accommodation of over four hundred students, and it has private study and sleeping rooms for one hundred and thirty. The cities of Champaign and Urbana, which are connected by a street railroad running past the University grounds, are well supplied with churches and schools, and will afford abundant facilities for boarding and rooming a large body of students.

The University domain, including ornamental and parade grounds, experimental and model farms, gardens, etc., comprises over one thousand acres of land.

AIMS OF THE UNIVERSITY.

The chief aim of the Industrial University, as expressed in the law of Congress, is "THE LIBERAL AND PRACTICAL EDUCATION OF THE INDUSTRIAL CLASSES in the several pursuits and professions in life." In order to this, it is required, under the Statute of Incor-

poration, "*to teach, in the most thorough manner, such branches of learning as are related to Agriculture and the Mechanic Arts, and Military Tactics, without excluding other scientific and classical studies.*" The hope of the Trustees and Faculty is that the Institution will produce scholars of sound learning, but also of practical sense and skill—men abreast with their times—men of christian culture, trained to affairs, and able and willing to lend a helping hand in all the great practical enterprises of this most practical age; and to be leaders, if need be, in those mighty industrial interests on which the social well-being and civilization of our country so much depend It is also their aim and hope that the University shall contribute to the increase and diffusion of real science, and especially of that science which bears upon and promotes the useful arts.

STUDIES, AND COURSES OF INSTRUCTION.

Instruction will be provided in the following branches of knowledge and arts: In the English, French, German, Latin and Greek languages and literatures; in the several branches of Mathematical science, pure and applied, except common Arithmetic; in the physical sciences, Chemistry, Natural Philosophy, Botany, Zoology, Entomology, Physiology—animal and vegetable, Comparative Anatomy, Mineralogy, Meteorology, Geology, Astronomy, History—ancient and modern, Political Economy, Civil Polity, Rural Economy and Law, Rhetoric, Philology, Logic, Mental Science, Ethics, History of Science and Philosophy; also in Penmanship, Drawing, Composition, Elocution, and Vocal Music; in Agriculture, Horticulture, Fruit Growing, Landscape Gardening, Architecture, Military Tactics, Civil and Military Engineering, Mechanics, Mining and Metallurgy, Analytical Chemistry, and in some of the Mechanic Arts.

In order to systematize the instruction, and to guide students in their course, the following schools or departments of instruction are organized, or will be as soon as required:

I.	The Department	of	Science, Literature, and Arts.
II.	"	"	Agriculture.
III.	"	"	Mechanical Science and Art.
IV.	"	"	Military Tactics and Engineering.
V.	"	"	Mining and Metallurgy.
VI.	"	"	Civil Engineering.

VII. The Department of Analytical and Applied Chemistry.
VIII. " " Natural History, Practical Geology, etc.
IX. " " Commercial Science and Art.

Students, regularly admitted, will be allowed to take such studies as they may choose, *provided* they are prepared to pursue the same successfully with the regular classes; and, *provided* that each student, unless specially excused, shall have at least fifteen regular lessons or lectures per week.

REQUIREMENTS FOR ADMISSION.

1st. Each student is required by law to be at least *fifteen years* of age, but it is believed that few will be found mature enough at this age to enter with the highest profit upon the studies of the University, and it is recommended, as a general rule, that students be at least eighteen years old before entering.

2d. The law also prescribes that "no student shall be admitted to instruction in any of the departments of the University who shall not previously undergo a satisfactory examination in each of the branches ordinarily taught in the common schools of the State." In addition to these, candidates for any particular department will be examined in such studies as may be necessary to fit them to pursue successfully the course in that department.

For admission to the regular course in Science, Literature, and Arts, the student should be prepared to sustain an examination in Natural Philosophy, Physiology, Algebra, (Davies' Bourdon or equivalent), Geometry (Davies' Legendre or equivalent), Latin Grammar, Cæsar, Cicero's Orations, Virgil's Georgics, and Æneid.

These additional studies, though not positively required for admission to the other departments, are strongly recommended.

The chief aim of all examinations for admission to the University is to ascertain the student's preparation to pursue successfully the studies of the course. Hence, thoroughness, and a general knowledge of the subject, will be accounted as of more importance than the amount studied. A student of earnest purpose and well disciplined mind will often pursue a new study more successfully than one of much more extensive preparation, but of less discipline and diligence. We are much more solicitous about the progress of the student after he enters, than about the preparation made before he enters, the University. Frequent and searching examinations will be held to test the progress made, and to deter-

mine each student's fitness to remain in the classes. The University cannot be held responsible for the lack of thoroughness in the common school studies of its students.

PREPARATORY CLASSES.

It is incompatible with the more appropriate and important work of the University to maintain a preparatory department; but to meet the exigencies of students not fully prepared, the Faculty will organize and instruct, during this first college year, classes in the preparatory studies, except the common school branches. When the higher classes shall be filled it will be impracticable to continue this preparatory work.

DEPARTMENT OF SCIENCE, LITERATURE, AND ARTS.

The studies in this department embrace those scientific and literary branches required for a liberal education, and which are important for the most successful study of the various industrial courses. The studies of the course have been arranged to come within four years, as follows:

FIRST, OR FRESHMAN YEAR.

	REGULAR STUDIES.	OPTIONAL AND EXTRA.
1st Term	—Trigonometry and Surveying.	
	Structural Botany.	
	Cicero de Senectute.	
	French.	Greek.
2d Term	—Analytical Geometry.	
	Systematic Botany.	
	Odes of Horace. French.	Greek.
3d Term	—Systematic Botany.	
	Descriptive Geometry and	Greek.
	Geometrical Drawing.	
	Satires of Horace. French Literature.	

SECOND, OR SOPHOMORE YEAR.

1st Term	—Calculus.	
	Chemistry. Zoology.	Tacitus—Annals.
	German.	Greek.
2d Term	—Chemistry.	
	Entomology, etc.	Tacitus.
	Physics—Mechanics.	Greek.
	German.	
3d Term	—Mineralogy.	
	Physics—Rhetoric.	Chemistry.
	German Literature.	Cicero de Oratore.

THIRD, OR JUNIOR YEAR.

	REGULAR STUDIES.	OPTIONAL AND EXTRA.
1st Term	Astronomy.	
	Geology.	Ancient History.
	English Literature.	
2d Term	Geology.	
	Modern History.	Astronomy.
	Meteorology.	English Literature.
3d Term	Logic.	
	Physical Geography.	English Literature.
	Modern History.	Butler's Analogy.

FOURTH, OR SENIOR YEAR.

1st Term	Mental Philosophy.	
	Political Economy.	Science of Education.
	Elements of Criticism.	
2d Term	Moral Philosophy.	
	History of Civilization.	Social Science.
	Civil Polity. Constitution of U. S.	Evidences of Christianity.
3d Term	History of Philosophy.	
	Modern Philology.	
	Constitutional Law.	
	History of Inductive Sciences.	

DEPARTMENT OF AGRICULTURE.

The studies in this department will be arranged ultimately in two courses:

1. The course in General Agriculture.
2. The course in Horticulture, Fruit Growing, and Landscape Gardening.

The aim of these courses will be to fit Students to manage successfully, for themselves or others, agricultural and horticultural estates and enterprises. The studies will be pursued partly by lectures, accompanied by courses of reading and examinations, and partly by the regular study of text books. Practical exercises and experiments on the farm, and in the gardens, nurseries, and fruit plantations, will constitute a part of the course.

The following conspectus of Agricultural and Horticultural science and art, exhibits a general view of the field designed to be covered by the instruction in these two courses:

mine each student's fitness to remain in the classes. The University cannot be held responsible for the lack of thoroughness in the common school studies of its students.

PREPARATORY CLASSES.

It is incompatible with the more appropriate and important work of the University to maintain a preparatory department; but to meet the exigencies of students not fully prepared, the Faculty will organize and instruct, during this first college year, classes in the preparatory studies, except the common school branches. When the higher classes shall be filled it will be impracticable to continue this preparatory work.

DEPARTMENT OF SCIENCE, LITERATURE, AND ARTS.

The studies in this department embrace those scientific and literary branches required for a liberal education, and which are important for the most successful study of the various industrial courses. The studies of the course have been arranged to come within four years, as follows:

FIRST, OR FRESHMAN YEAR.

	REGULAR STUDIES.	OPTIONAL AND EXTRA.
1st Term	Trigonometry and Surveying.	
	Structural Botany.	
	Cicero de Senectute.	
	French.	Greek.
2d Term	Analytical Geometry.	
	Systematic Botany.	
	Odes of Horace. French.	Greek.
3d Term	Systematic Botany.	
	Descriptive Geometry and Geometrical Drawing.	Greek.
	Satires of Horace. French Literature.	

SECOND, OR SOPHOMORE YEAR.

	REGULAR STUDIES.	OPTIONAL AND EXTRA.
1st Term	Calculus.	
	Chemistry. Zoology.	Tacitus—Annals.
	German.	Greek.
2d Term	Chemistry.	
	Entomology, etc.	Tacitus.
	Physics—Mechanics.	Greek.
	German.	
3d Term	Mineralogy.	
	Physics—Rhetoric.	Chemistry.
	German Literature.	Cicero de Oratore.

1st Term—[illegible]

[illegible]

[illegible]

2d Term—[illegible]

Modern [illegible]

Meteorology

3d Term—[illegible]

Physical [illegible]

Modern [illegible]

[illegible]

1st Term—Mental Philosophy

Political Economy [illegible]

Elements of [illegible]

2d Term—Moral Philosophy

History of [illegible]

Civil Polity [illegible]

3d Term—History of Philosophy

Modern [illegible]

Constitutional Law

History of [illegible]

DEPARTMENT OF [illegible].

The studies in this department will be arranged ultimately in two courses:

1. The course in General Agriculture.

2. The course in [illegible], Fruit Growing, and Landscape Gardening.

The aim of these courses will be to fit Students to manage successfully for themselves or others, agricultural and horticultural [illegible] and enterprises. The studies will be pursued partly by [illegible] accompanied by courses of reading and examinations, [illegible] by the regular study of text books. Practical exercises [illegible] experiments on the farm, and in the gardens, nurseries, and [illegible], will constitute a part of the course.

The following conspectus of Agricultural and Horticultural [illegible] art, exhibits a general view of the field designed to be [illegible] the instruction in these two courses :

THE FARM.

- **CHOICE OF FARM.**
  - With reference to Markets.
  - With reference to Climate and its local modifications.
  - With reference to Soil and Subsoil and Slopes.
- **ARRANGEMENT.**
  - Sub-divisions into Fields, or Farms of different cultures.
  - Sites of Farm buildings.
- **FARM STRUCTURES.**
  - Fences.
    - Live; as Hedges.
    - Wood; Boards; Rails; Paling.
    - Stone; Wire.
  - Buildings.
    - Farm House; Dairy House.
    - Barns; Ricks; Cribs, etc., for grain, hay, etc.
    - Cellars; Fruit Houses, etc.
    - Cattle Barns; Stables, etc.
    - Conservatories. Green Houses, Hot Houses, etc.
    - Pens Styes, etc., for sheep and swine.
    - Hennery; Bee House, etc.
- **FARM IMPLEMENTS.**
- **ROADS AND BRIDGES.**
- **SOILS.**
  - Elements.
    - Mineral.
    - Vegetable.
    - Animal.
  - Classification.
    - Argillaceous or Clayey.
    - Silicious or Sandy.
    - Peaty.
  - Cultivation and Improvement.
    - By Chemical Agents.
      - Mineral manures.
      - Organic.—Animal; Vegetable.
      - Manurial green crops.
    - By Mechanical Agents.
      - Draining.
      - Subsoiling.
      - Plowing; Dragging; Rolling.
    - By Fallowing.
    - By Rotation of Crops.
- **SUBSOIL.** Elements, Classification, Treatment.
- **FERTILIZERS.**
  - Chemical Composition.
  - Manufacture, Compost.
  - Preservation.
  - Modes of Application.

PLANT CULTURE.

- USEFUL
  - Grass Crops
    - Pastures — Pasture grasses.
    - Meadows
      - Cutting grass.
      - Curing.
      - Handling and Pressing.
  - Grain Crops
    - Corn
      - Varieties.
      - Planting and Cultivating.
      - Harvesting and Preserving.
    - Wheat; Rye. Barley; Oats. Buckwheat.
      - Varieties.
      - Sowingand Cultivation.
      - Harvesting, Threshing and Preserving
  - Root Crops
    - Potatoes.
    - Sweet Potatoes.
    - Turnips, Beets, Carrots, etc.
  - Textile or Fibrile Crops — Flax; Hemp; Cotton.
  - Cucurbitaceous Crops — Pumpkins; Melons, etc.
  - Trees — Forest and Fruit.
  - Broom Corn; Willow Bushes, Vines, etc.
  - (All of the above:)
    - Structure, Physiology.
    - Chemical Composition.
    - Vegetable tissues.
    - Varieties.
    - Habits and Diseases.
    - Insects.
    - PRODUCTS.
      - Starch,
      - Sugar, etc.,
      - Flour, etc.,
      - Cider,
      - Wine, etc.,
      - Dyes, Acids,
      - Essences,
      - Medicines.
- WEEDS
  - Classes; Habits.
  - Uses; Products.
  - Modes of Extermination.
- PROPAGATION AND IMPROVEMENT
  - Seeding.
  - Hybridizing.
  - Transplanting.
  - Cutting; Layering.
  - Pruning.
  - Inoculating; Grafting.

ANIMAL HUSBANDRY.

- DOMESTIC.
  - Horses, Mules, etc.
  - Working Cattle.
  - Milch Cows.
  - Sheep, Swine.
  - Poultry, Bees.
    - Breeds and Varieties.
    - Structure and Physiology.
    - Animal Tissues, Chemistry.
    - Qualities; Speed; Strength; Fattening; Milking, etc
    - Habits and Diseases.
    - Products.
- NOXIOUS.
  - Insects.
  - Reptiles.
  - Birds.
  - Mammals.
    - Classes.
    - Values.
    - Habits.
    - Extermination.
- STOCK RAISING.
  - Breeding and its Principles.
  - Care of Young.
  - Feeding for fat, milk, work.
  - Training.
- VETERINARY SURGERY AND MEDICINE.

RURAL LAWS, HISTORY, LITERATURE AND ECONOMY OF AGRICULTURE.

These studies will be arranged in a course occupying three years, as follows:

FIRST YEAR.

THE FARM—Its measurements and mapping; sub-divisions—meadows, pastures, orchards, woodlands, gardens, etc. Fences, hedges, farm buildings. Soils—classification and mechanical treatment of soils, plowing, etc. Drainage. PLANT CULTURE.—Structure and Physiology of plants; classes of the useful plants, their characteristics, varieties, habits, and values. Wheat culture, maize culture, grass culture, root culture, fruit culture begun, apples, pears, peaches, etc.

COLLATERAL STUDIES.—English language and composition, surveying, drawing, botany, French language and literature.

SECOND YEAR.

THE FARM.—Chemical elements and chemical treatment of soils. Fertilizers—their composition, manufacture, preservation and application. Climate, influence of light, heat, and electricity, on soils and vegetable growth. FARM IMPLEMENTS.—Principles of structure and use. Road making.

FRUIT CULTURE.—Modes of propagation, production of new varieties, diseases of fruit trees. Insects injurious to vegetation.

ANIMAL HUSBANDRY.—Breeds and varieties of neat cattle, horses, sheep, and swine. Principles of breeding, rearing, training, fattening, etc. Chemical composition of food, and preparation of the several varieties. Sheep husbandry; poultry; bees.

COLLATERAL STUDIES.—Mechanics, chemistry, zoology, entomology, mineralogy, German language and literature.

THIRD YEAR.

AGRICULTURAL ECONOMY.—Relation of Agriculture to the other industries and to commerce. The several branches of Agriculture. Agricultural book-keeping, the farm book, herd book, etc. RURAL LAW—of tenures and conveyances of land, of highways, of cattle, of fences, of noxious weeds, etc. Veterinary surgery and medicine. Landscape gardening, and laying out of large farming estates. Rural Architecture and Engineering, Foreign Agriculture, History and Literature of Agriculture.

COLLATERAL STUDIES.—Geology, Meteorology, Physical Geography, Inductive Logic, Political Economy, History and Civil Polity, English Literature.

DEPARTMENT OF MECHANICAL SCIENCE AND ENGINEERING.

The studies of this course will also occupy three years, and will embrace the following branches and topics:

MATHEMATICS.—Trigonometry, plain and spherical. Descriptive Geometry and geometrical drawing. Analytical Geometry, Conic Sections, and Differential Calculus.

PHYSICS.—Properties of Matter, Laws of Motion, Forces, Mechanics of Solids, Liquids, and Gases. Laws of sound, of light, of heat.

ANALYTIC AND APPLIED MECHANICS.—Strength of materials. Theory of machines, and principles of Mechanism. *Estimates of rigidity* and friction, and of the useful

effect of Machines. Construction and Calculation of Strength and Proportion of Parts of Machines, Hand Machinery, Hydraulic Motors, Steam Engines, Horse powers, Hot Air and Gas Engines. Construction and arrangement of machinery in Mills for various manufactures.

CHEMISTRY—Elementary, and applied.

Botany, Zoology, Geology, Mineralogy, Meteorology.

English, French and German languages. History, Philosophy, etc.

DRAWING.—Elementary, geometrical, and free hand. Drawing of Machines. Principles of Perspective. Lights and Shadows. Coloring and Theory of Colors. Architectural drawing, plans, elevations, perspective views, working plans, etc.

ARCHITECTURE.—Its principles and styles. Principles and modes of warming, ventilation, etc.

Carpentery, and principles involved in the several trades.

The University already has one shop; and students, during the past term, have been employed to some extent in practical mechanics. It is hoped that other buildings and facilities for practical instruction will soon be added, so that students may be enabled to acquire some skill in the use of tools, in the construction of models, and in the management of motor powers.

The candidates for this course must be prepared to sustain an examination in the branches required by law, and in Algebra and Geometry.

THE DEPARTMENT OF MILITARY SCIENCE.

The course of instruction in this department will embrace the study of Tactics in the various arms, both of the Company and Battalion, Grand Tactics, and Military Engineering, including principles of fortifications, siege works, and gunnery. The studies of the course, and the collateral studies, will be arranged as fast as the wants of the department shall require it.

All of the students wear a uniform, and a military drill is held three times a week, or oftener.

Candidates for the course in Military Engineering must sustain the same examinations as those required in the Mechanical Department.

The Departments of Mining and Metallurgy, and of Civil Engineering, will embrace the studies usual in such departments, and these studies will be arranged in courses as soon as they shall be required. The instruction will comprehend a full set of field exercises with instruments, and excursions to mines, public works, etc.

The Department of Analytical and Applied Chemistry will embrace a full course of instruction in Analytical Chemistry, both qualitative and quantitative, analysis of soils, of animal and vegetable substances, and of minerals, together with the study of chemistry applied to the arts. It will include also a full course of laboratory practice, and such collateral branches of knowledge as may be important or useful.

The Department of Natural History and Practical Geology will embrace such courses of instruction as will fit students to become explorers, and collectors or curators of scientific collections, to conduct geological explorations and surveys, or to serve as teachers, or experts, in these departments of knowledge. The course will include practical excursions and surveys, the collection and preservation of specimens, the practical work in the laboratory and cabinets, and the drawing, sketching, etc., necessary for illustrations.

THE COMMERCIAL DEPARTMENT.

The course in this department is designed to fit students to become practical accountants, and successful agents and managers of commercial enterprises. It will embrace a full course of instruction in Book-keeping in its various books and most improved forms, equal in every respect to that given in the best Commercial Colleges. It will also include a thorough study of all such branches of knowledge as will cast light upon the great phenomena and laws of business and traffic, domestic and foreign; upon the laws of production, exchange, markets, and currency; and commercial law, commercial usages and history, together with such other scientific, literary, and philosophical studies as may be useful to develop the mind and practical talent. It is hoped that at an early day this Department of the University may be fully developed, and an institution of solid worth, rather than of mere splendid pretension, may be opened to young men who wish to fit themselves for the arduous and riskful responsibilities of the merchant and business man.

The course in Book-keeping will be opened at once, and the full course will be developed as soon as the wants of students shall demand it.

LECTURE COURSES.

It is a part of the plan of the University to provide courses of lectures in special departments of knowledge and art. These lectures will be given by regular members of the Faculty, or by eminent scholars and authors whose services may be secured for this purpose. Dr. John A. Warder, the eminent American pomologist, has already accepted an appointment, and will deliver, during the winter term, a course of lectures on fruit growing, etc. Rev. Edward Eggleston, an eminent writer and editor, is also under appointment as lecturer on English Literature, and negotiations are in progress to secure other lecturers.

A weekly lecture is delivered to all the students, on manners, formation of habits and character; on the conditions of health, happiness, and success in life; on the general duties and affairs of life; on methods of study, courses of reading, etc.

AGRICULTURAL LECTURE SESSION.

It is also in contemplation to hold at the University, during the winter, a lecture session of two weeks, for several courses of lectures on the several branches of Agricultural and Horticultural science, to be delivered by gentlemen of eminent acquirements and experience in these departments. Due notice of the time of this course will be given. It is hoped and expected that these lectures will bring together a large number of the practical farmers and fruit growers of this and adjoining States, and that discussions of great value will follow the several lectures. Arrangements will be made to provide board at reasonable rates, and comfortable quarters, for as many as may attend.

APPARATUS OF INSTRUCTION.

A costly set of philosophical and chemical apparatus has just been received from the celebrated manufactory of E. S. Richie & Son, Boston, and large additions will be made at an early day. Rooms are set apart for a good working laboratory for the students in analytical chemistry, which will be fitted up under the direction of the Professor in Chemistry.

Valuable collections have already been secured for cabinets, in Mineralogy, Botany, Conchology, Geology, Palæontology, and in

several departments in Zoology; and Prof. Powell, of the Chair of Natural History, is now absent in charge of a scientific expedition to the region of the Colorado of the North, making additional collections.

The illustrative apparatus in the Departments of Agriculture is designed to be very full and complete. The University owns over one thousand acres of improved farming lands, equal to any in the State. Forty acres are set apart for gardens, nurseries, and specimen orchards. The remainder are to be used for experimental and stock farms, orchards, arboretums, etc. Through the liberality of manufacturers, the University is rapidly accumulating a collection of agricultural implements; and cabinets and drawings of specimen fruits, vegetables, etc., will be added as fast as practicable. The ornamental grounds around the building already contain a large variety of evergreens and flowering plants.

A collection of maps, charts, models, and engravings, is also begun, and is being steadily increased by donation or purchase.

THE LABOR SYSTEM.

Practice in some form, and to some extent, is indispensable to a practical education. It is the divorcement of the theoretical and practical which renders so much of education mere "book learning." To guard against this fatal defect, the trustees have directed that the manual labor system shall be thoroughly tried, and all students who are not excused on account of physical inability are required to labor from *one* to *three* hours each day, except Saturday and Sunday. During the Spring term the labor occupied two hours each day. During the Autumn it will occupy less rather than more time.

The students go out in squads, under their military officers, and under the general supervision of members of the Faculty.

The labor is designed to be educational, and to exhibit the practical applications of the theories taught by the text books and in the lecture room. Thus far it has been popular among the students, several attributing to it the preservation of their health through a long term of severe study. They accomplished, altogether, a large amount of valuable work, and were proud to point to the grounds, fenced, planted with trees, and ornamented by their own labor. It was found to facilitate, rather than hinder

study, and afforded a much more valuable means of physical culture than any system of gymnastics.

The labor is compensated in proportion to the ability and fidelity of each laborer, the maximum compensation being eight cents an hour. Many students voluntarily worked over hours, and received for such overwork twelve and a half cents an hour. The experience of the term tended to confirm the belief that this union and alternation of mental and muscular effort will not only give the "sound mind in a sound body," but will help to produce educated men who will be strong, practical, and self-reliant, full of resource, and practical in judgment, the physical equals of the strongest, and the mental peers of the wisest; redeeming higher education from the odium of puny forms and pallid faces, and restoring the long lost and much needed sympathy between educated men and the great industrial and business classes.

It is not expected that all prejudice against work will disappear at once, or that labor will at once assume for all, its position of native dignity and honor; but we may confidently hope, if our increasing numbers do not render it impracticable to furnish profitable employment, finally to overcome the strongest prejudices, and render the labor system one of the most popular features of the University, with the public as well as with the students themselves.

THE UNIVERSITY UNIFORM.

Under the authority of the act of incorporation the Trustees have prescribed that all the students shall wear the University uniform. This uniform consists of a suit of cadet-gray mixed cloth, of the same color and quality as that worn at West Point, and manufactured by the same establishment.

The coat is a single-breasted frock, buttoned to chin, with standing collar, and a trimming of black mohair cord on shoulders, in loops. The vest is also single-breasted, buttoned to chin, with standing collar. Buttons for coat and vest are manufactured purposely for the University. They are gilt, of medalion style, the design being a sheaf of wheat surrounded with the words, "Illinois Industrial University." The pants have a welt of dark blue in the outside seams. The suit is a very tasteful dress, and is substantial and enduring. An arrangement has been made with responsible parties to furnish the suits to students at twenty-seven

dollars each. Students can procure them ready made on their arrival here.

The University cap is of dark blue cloth, and ornamented with the initials I. I. U., surrounded by a silver wreath in front.

The arms and equipments used in the drill are furnished by the State.

Students will wear their uniform always on parade, but in their rooms, and at recitation, may wear other clothing. An army blouse, or fatigue dress, will be furnished at low rates to those that want it.

HONORARY SCHOLARSHIPS.

The Legislature prescribed that one Honorary Scholar shall be admitted from each county in the State. These scholarships, which are designed "for the benefit of the descendants of soldiers and seamen who served in the armies and navies of the United States during the late rebellion," entitle the incumbents to free tuition. The Trustees have also authorized the Faculty of the University to remit the tuition of worthy young men whose circumstances are such as to require this aid.

PRIZE SCHOLARSHIPS.

A movement has been started to secure in each county of the State the endowment of a Prize Scholarship, with a permanent fund of $1,000 for each. The plan contemplates that the income of thus fund shall be annually awarded to the best scholar from the public schools of the county, who shall present himself as a candidate for the University. The scholarship shall be determined by a competitive examination, to be held in each county, under the direction of the Regent of the University and the State Superintendent of Public Instruction. The examinations will be held the first Friday in September, or at such time and place as the County Superintendent of Schools may appoint. Honorary scholars will be examined at the same time. Only a few of the counties have as yet provided for the prize scholarship, but it is hoped that a prize of greater or less amount will be provided in each county in which a worthy candidate shall be selected.

STUDENTS' DORMITORIES AND BOARD.

There are in the University building about sixty-five private rooms for students, which are rented to the students who first apply. Each room is designed for the accommodation of two students. These rooms are fourteen feet long and ten feet wide. They are without any furniture, it being deemed best that students shall furnish their own rooms. It is earnestly recommended for health's sake that each student have a separate bed. A narrow bedstead and mattress, with suitable clothing, should be provided by each. A study table, chairs, and a small coal stove, may be provided in common by the occupants of a room.

There is a boarding hall in the University building, where good board is provided at the lowest practicable rates. These rates will not exceed $3 50 per week. Good private boarding houses are already springing up around the University, where either day board, or board and rooms can be obtained, with the advantages of the family circle. Several students have provided themselves with meals in their rooms at an expense varying from $1 to $1 50 per week.

To avoid unnecessary litter about the grounds, coal is purchased by the University at wholesale, and furnished to students at cost.

TERMS AND VACATIONS.

The college year is divided into three terms of twelve weeks each. The work of the term will in all cases commence on Monday morning, and students who fail to be present at the opening will be expected to make up, by private study, every lesson which may have been passed over by their classes. Examination of new students will be held the Saturday preceding the opening of the term.

The only vacations are, the holiday recess, including Christmas and New Year's, a vacation of one week between the winter and spring term, and the long vacation at the close of the third term.

The calendar for 1868–9 will be as follows:

First term opens Monday, Sept. 14; closes Friday, Dec. 4.
Second term opens Monday, Dec. 7; closes Friday, March 5, 1869.
Third term opens Monday, March 15; closes Friday, June 4.
Holiday recess from December 24 to January 2, 1869.
Spring vacation from March 6 to March 15.

EXPENSES.

Tuition to Illinois students	$15 00	per annum.
Tuition to foreign students	20 00	"
Fee for incidentals	2 50	per term.
Room rent for each student	4 00	"

Room rent is only charged to students who room in the University building.

Each student is required to pay a Matriculation fee of $10 on first entering the Institution. This entitles him to membership till he completes his studies.

Honorary and Prize Scholars pay no tuition fee, but pay all other fees.

All bills due the University must be paid, and the Treasurer's receipt be shown to the Regent, before the student can enter the classes. Students boarding in University Hall will be required to deposit with the Steward $10 each, to apply on their board bills at the close of the term.

The annual expense of a residence at the University, exclusive of books and clothing, will be nearly as follows:

Tuition, room rent, and incidentals, from	$84 50	to	$89 50
Board in Hall	108 00	to	126 00
Fuel and lights	10 50	to	15 50
Washing, 75c. per dozen	10 00	to	15 00
Total	$163 00		$195 00

Many young men reduce the expense to within $100 a year, and pay this by their labor during the year. It ought to be known that *any young man can pay his way through college* who is willing, for the sake of an education, to practice steadily the virtues of industry and economy.

GOVERNMENT.

The University is designed for *men*, not *children*, and its government rests in an appeal to the manly feeling and sense of honor of its students. It has but one law, and that is, "Do RIGHT." If any student shall show himself so weak or corrupt that he can not, when thus treated, refrain from vicious conduct, he will receive permission to leave the institution, where his presence can only injure others, without being of any benefit to himself. But no

pains will be spared to counsel the inexperienced, to admonish the careless, and to save the tempted. Especially will it be an object to establish and maintain that high toned, refined, and honorable public sentiment, which is at once the best safeguard against meanness and vice, and a constant inspiration to nobleness and virtue.

LITERARY SOCIETIES.

Two Literary societies have already been organized by the students—the Philomathean, and the Adelphic—and measures are being taken by each to secure libraries.

DONATIONS.

Acknowledgements are due to the following gentlemen for valuable donations to the University:

L. Vandesyde, Calumet, 1 set reed mats.

Emerson & Co., Rockford, 1 Jones' hand corn planter.

Fuller, Palmer & Co., Chicago, 50 sash, for garden use.

R. S. Wheatley, DuQuoin, 1 subsoil and garden plow.

Barlow, Wood & Co., Quincy, 1 Vandiver's corn planter, with drill attachment.

Furst & Bradley, Chicago, 1 walking cultivator.

Clark & Utter, Rockford, 1 Gorham seeder and cultivator combined.

Wm. Lintner, Decatur, 1 farm pump.

J. J. Inglehart, Matteson, 1 Granger patent rotating harrow.

Hibbard & Finch, Champaign, 1 two-horse cultivator, Frazier's patent, and 1 Kalamazoo three-horse clevis.

Robert Douglas, Waukegan, collection evergreen seeds.

S. Wilbur, Momence, duplicate collection flower seeds.

D. M. Ferry & Co , Detroit, Mich., collection flower and garden seeds, also 1 package Beher wheat, imported from Egypt.

T. W. Lachore, Blue Island, 2 wheel hoes.

B. Dornblazer, Joliet, 1 Hoosier riding or walking cultivator, and 1 double shovel plough.

J. C. Wilson, Crete, 1 patent rotary harrow.

Phœnix, Bloomington, 100 rose bushes, and collection of flowering shrubs and bedding plants.

Edgar Sanders, Chicago, 100 select bedding plants.

P. S. Merevale, Chicago, 1 Allen's Weeder, 1 hexamer pronged hoe.

Joseph Mainhofer, Ottawa, 1 Messenger, or Gopher cultivator, with extra shares.

John Deere, Moline, 1 improved P. P. plow.

O. M. Railsback, Champaign, 300 select green-house and bedding plants.

Jacob Strayer & Co., South Bend, Ind., 1 Statesman force feeding grain drill, grass sower and surveyor.

Fairbanks, Greenleaf & Co., Chicago, 1 set of grocer scales, 1 set counter scales discount on hay scales, $75.

H. C. Rector, Champaign, 1 Blum's patent plow and cultivator.

M. A. & J. M. Cravath, Bloomington, 1 revolving cultivator and hilling machine.

M. Dorsett, Chicago, 1 model straw rick, with ventilating tube for preserving hay or grain, and movable roof.

M. Cochrane, Architect, 1 fine colored lithograph of new State Capitol.

APPENDIX.

BOARD OF TRUSTEES.

MEMBERS EX-OFFICIO.

HON. RICHARD J. OGLESBY, *Governor.*
HON. NEWTON BATEMAN, LL. D., *Sup't of Public Instruction.*
HON. A. B. MCCONNELL, *President State Agricultural Society.*
JOHN M. GREGORY, LL. D., *Regent of University.*

MEMBERS APPOINTED BY THE GOVERNOR AND SENATE.

Name.	District.	Post Office.	County.
Lemuel Allen	8th Congressional	Pekin	Tazewell
Alexander Blackburn	9th Congressional	Macomb	McDonough
Mason Brayman	2d Grand Judicial	Springfield	Sangamon
A. M. Brown	13th Congressional	Villa Ridge	Pulaski
Edwin Lee Brown	3d Grand Judicial	Chicago	Cook
Horatio C. Burchard	5th Congressional	Freeport	Stephenson
J. C. Burroughs	3d Grand Judicial	Chicago	Cook
Emery Cobb	3d Grand Judicial	Kankakee	Kankakee
J. O. Cunningham	2d Grand Judicial	Urbana	Champaign
M. L. Dunlap	7th Congressional	Champaign	Champaign
Samuel Edwards	5th Congressional	LaMoille	Bureau
Willard C. Flagg	12th Congressional	Alton	Madison
O. B. Galusha	6th Congressional	Morris	Grundy
M. C. Goltra	10th Congressional	Jacksonville	Morgan
David S. Hammond	1st Congressional	Elgin	Kane
*George Harding	2d Grand Judicial	Paris	Edgar
S. S. Hayes	3d Grand Judicial	Chicago	Cook
J. P. Hungate	11th Congressional	Louisville	Clay
John S. Johnson	4th Congressional	Warsaw	Hancock
Luther Lawrence	2d Congressional	Mt. Sterling	Brown
Isaac W. Mahan	1st Grand Judicial	Centralia	Marion
L. B. McMurray	1st Grand Judicial	Effingham	Effingham
J. H. Pickrell	2d Grand Judicial	Harristown	Macon
Burden Pullen	1st Grand Judicial	Centralia	Marion
Thomas Quick	1st Grand Judicial	Irvington	Washington
J. W. Scroggs	2d Grand Judicial	Champaign	Champaign
†Charles H. Topping	1st Grand Judicial	Anna	Union
John M. VanOsdel	3d Grand Judicial	Chicago	Cook

*Deceased. †Resigned.

OFFICERS AND COMMITTEES OF BOARD OF TRUSTEES.

PRESIDENT.—JOHN M. GREGORY, LL. D.

CORRESPONDING SECRETARY.—WILLARD C. FLAGG.

RECORDING SECRETARY.—JONATHAN PERIAM.

TREASURER.—JOHN W. BUNN, Springfield.

Executive Committee.—J. M. Gregory, *ex officio*, E. Cobb, J. O. Cunningham, M. C. Goltra, L. S. Mahan, B. Pullen, Thos. Quick, J. M. VanOsdell, *Geo. Harding.

Finance Committee.—Emery Cobb, J. O. Cunningham, J. H. Pickrell, H. C. Burchard, *Geo. Harding, and the Regent.

Committee on Faculty and Studies.—The Regent, N. Bateman, M. Brayman, W. C. Flagg, S. S. Hayes.

Auditing Committee.—L. W. Lawrence, S. Edwards, O. B. Galusha, H. C. Burchard A. M. Brown.

Committee on Building and Grounds.—M. C. Goltra, J. O. Cunningham, J. M. Van Osdell, J. S. Johnson, A. B. McConnell, and the Regent.

Committee on Agricultural Department.—Thomas Quick, J. H. Pickrell, L. Allen, A. Blackburn, L. B. McMurray.

Committee on Horticultural Department.—B. Pullen, M. L. Dunlap, W. C. Flagg, O. B. Galusha, Samuel Edwards.

Committee on Mechanical Department.—J. W. Scroggs, M. C. Goltra, E. L. Brown, J. M. VanOsdell.

Committee on Military Department.—M. Brayman, T. Quick, L. W. Lawrence, M. L. Dunlap.

Committee on Library and Cabinet.—The Regent, W. C. Flagg, N. Bateman, A. M. Brown, J. S. Johnson.

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*Deceased.

OFFICERS AND INSTRUCTORS.

JOHN M. GREGORY, LL. D..
REGENT AND PROFESSOR OF PHILOSOPHY.

WILLIAM M. BAKER, A. M.,
PROFESSOR OF ENGLISH LANGUAGE AND LITERATURE, AND INSTRUCTOR IN NATURAL PHILOSOPHY.

GEORGE W. ATHERTON, M. A.,
PROFESSOR OF HISTORY AND SOCIAL SCIENCE, AND INSTRUCTOR IN LATIN.

J. W. POWELL, M. A.,
PROFESSOR OF NATURAL HISTORY AND GEOLOGY.

WILLARD F. BLISS, M. A.,
PROFESSOR OF AGRICULTURE, AND INSTRUCTOR IN FRENCH.

A. P. S. STUART, M. A.,
PROFESSOR OF THEORETICAL AND APPLIED CHEMISTRY.

---

*PROFESSOR OF MATHEMATICS.

THOMAS J BURRILL,
ASSISTANT PROFESSOR OF NATURAL SCIENCE.

COL. S. W. SHATTUCK, M. A.,
ASSISTANT PROFESSOR OF MATHEMATICS, AND INSTRUCTOR IN MILITARY TACTICS.

JONATHAN PERIAM,
HEAD FARMER AND SUPERINTENDENT OF PRACTICAL AGRICULTURE.

CAPT. EDWARD SCHNEIDER,
INSTRUCTOR IN BOOK KEEPING AND IN GERMAN.

NON-RESIDENT PROFESSORS.

JOHN A. WARDER, M. D., CINCINNATI,
LECTURER ON VEGETABLE PHYSIOLOGY AND FRUIT GROWING.

EDWARD EGGLESTON, M. A., CHICAGO,
LECTURER ON ENGLISH LITERATURE.

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*This Professorship is expected to be filled immediately.

CATALOGUE OF STUDENTS.

SPRING TERM OF 1868.

Names.	Residence.		Nativity.
	City.	County.	
Edwin Fletcher Abbott	Centralia	Marion	Wisconsin
Benton Alfred	Urbana	Champaign	Illinois
Charles Edward Allard	Rosecliare	Hardin	Indiana
Wilbur Clinton Alvord	Bement	Piat	Mass
David Bailey	Champaign	Champaign	Illinois
Herbert Ozias Barber	Rantoul	Champaign	Canada E.
Delanson Elroy Barnard	Kankakee	Kankakee	Indiana
Joseph T. Beasley	Champaign	Champaign	Indiana
Louis Henry Beidler	Champaign	Champaign	Illinois
George W. Brewer	Champaign	Champaign	Ohio
James William Buel	Golconda	Pope	Illinois
Frank Morgan Burroughs	Champaign	Champaign	New York
Milo Benedict Burwash	Champaign T'p	Champaign	Canada E.
Thomas Nathaniel Burwash	Champaign T'p	Champaign	Canada E.
John Wilbur Busey	Urbana	Champaign	Illinois
Oscar Frederick Cady	Champaign	Champaign	Ohio
Thomas Benton Columbia	Champaign	Champaign	Illinois
William Harrison Crayne	Urbana	Champaign	Indiana
Joseph Buchanan Dare	Urbana	Champaign	Illinois
John Jefferson Davis	Freeport	Stephenson	Illinois
Frank Dexter Dole	Mattoon	Coles	Illinois
Herbert Eaton	Philo	Champaign	N. Jersey
Elias Quincy Emerson	Champaign	Champaign	Mass.
Charles Austin Falls	Urbana	Champaign	Kentucky
Edwin Freeman	South Pass	Union	Conn
Fayette Gere	Urbana	Champaign	Illinois
James Ebenezer Graham	Galena	JoDaviess	Illinois
Charles Peyton Graham	Champaign	Champaign	Kentucky
Charles Henry Hall	Danville	Vermilion	Indiana
William Townsend Hamer	Champaign	Champaign	Indiana
Miles Fayette Hatch	Bivens' Mills	McHenry	Illinois
Edmund Brooks Hazard	Lynden	Whiteside	Illinois
Marion Franklin Kirkpatrick	Champaign	Champaign	Illinois
Theodore Julius Kraft	Belleville	St. Clair	Illinois
Peter Winfield Lawver	Freeport	Stephenson	Illinois
Joseph Kirk Love	Sidney	Champaign	Ohio
James Newton Matthews	Mason	Effingham	Indiana
Joseph Judson McClain	Urbana	Champaign	Illinois
Charles Hovey Nodine	Champaign	Champaign	New York
John Marshall Pancake	Mahomet	Champaign	Illinois
John Joshua Parish	Raleigh	Saline	Illinois
Wildey Lemon Park	Urbana	Champaign	Ohio
Calvin Ebenezer Parker	Philo	Champaign	Mass.
John Charles Patton	Paxton	Ford	Illinois
Clark Lewis Payton	Danville	Vermilion	Illinois
Winfield Scott Pinnell	Charleston	Coles	Illinois
Millard Fillmore Porterfield	Sidney	Champaign	Penn
Adolphus Lafayette Rader	Charleston	Coles	Tennessee
George Martin Randall	Yellowhead	Kankakee	Michigan

Names.	Residence.		Nativity.
	City.	County.	
Isaac Stuart Raymond	Champaign	Champaign	Ohio
Willie Albert Reiss	Belleville	St. Clair	Illinois
Stephen Avery Reynolds	Belvidere	Boone	Wisconsin
Samuel Earhart Rigg	Champaign	Champaign	Penn
Ozias Riley	Urbana	Champaign	Illinois
James Simpson Romine	Urbana	Champaign	Illinois
Reuben Roughton	Rantoul	Champaign	England
Albert Russell	Urbana	Champaign	Illinois
Edgar Sawyer	Tiskilwa	Bureau	Illinois
Luther Edgar Shinn	Urbana	Champaign	Illinois
Wilbur Thomas Shinn	Urbana	Champaign	Illinois
Howard Silver	Urbana	Champaign	Ohio
Charles Wallace Silver	Urbana	Champaign	Ohio
Albert Alexander Snelling	Kinmundy	Marion	N. Hamp
Henry Augustus Staples	Springfield	Sangamon	Maine
Thomas Stoddert	Charleston	Coles	Illinois
James David Swearingen	Champaign	Champaign	Illinois
John Lewis Taylor	Urbana	Champaign	Ohio
Irving Terwilliger	Belvidere	Boone	Illinois
Samuel West Thompson	Homer	Champaign	Illinois
Irwin Bedell Towle	Urbana	Champaign	New York
John R. Trevett	Champaign	Champaign	Illinois
Samuel Thompson Weber	Raleigh	Saline	Illinois
Samuel Judson Westlake	Springfield	Sangamon	Illinois
Jacob Norton Wharton	Bement	Piatt	Penn.
Samuel Weaver White	Paxton	Ford	Ohio
James Alexander Williams	Urbana	Champaign	Illinois
Paul Way Woody	Champaign	Champaign	Indiana

Total number of students ... 77

From Champaign county	45	From Stephenson county	2		
" Coles "	4	" Vermilion "	2		
" Boone "	2	" Bureau "	1		
" Ford "	2	" Effingham "	1		
" Kankakee "	2	" Hardin "	1		
" Marion "	2	" JoDaviess "	1		
" Scott "	2	" McHenry "	1		
" Sangamon "	2	" Pope "	1		
" St. Clair "	2	" Union "	1		
" Saline "	2	" Whitesides "	1		
			—	77	

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APRILL 8, 1868.

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History and Biography:	
Bancroft's History of the United States	9
Benton's Thirty Years in the United States Senate	2
The American Conflict—Greeley	2
The Federalist—Dawson	1
War for the Union—Whitney, Vol. 1	1
The Lost Cause—Pollard	1
Annals of the Army of the Cumberland	1
History of the Pennsylvania Reserve Corps	1
McIntosh's Book of Indians	1
Early History of Michigan—Sheldon	1
Prescott's Conquest of Peru	2
Prescott's Conquest of Mexico	8
Prescott's Miscellanies	1
Report of the Peace Convention in 1861	1
Report on the Conduct of the War, 1862-1866	8
What I saw on the West Coast of South and North America	1
General McClellan and the War	1
The Peninsular Campaign in Virginia—Marks	1
Sherman's March through the South	1
My Diary North and South—Russell	1
Three Years in the Army—Capt. Blake	1
Hawkins' Zouaves	1
Leaves from the Diary of an Army Surgeon—Ellis	1
Thirteen Months in the Rebel Army	1
Nurse and Spy	1
American History—J. Abbott	8
Sims' History of South Carolina	1
Washington and His Generals—J. T. Headley	2
America and Europe—Gurowski	1
Recollections of H. W. Allen—S. A. Dorsey	1
History of the Atlantic Telegraph—Field	1
America before Europe—Gasparin	1
Travels in Peru—Tschudi	1
American Institutions—DeToqueville	1
Lectures on Modern History—Arnold	1
Lamartine's History of the Girondists	8
Schegel's Lectures on Modern History	1
Life of Richard Cœur-de-Lion—James	2
Lectures on Roman History—Niebuhr	8
The Old Roman World—J. Lord	1
History of the Romans—Merivale	7
Frederick the Great and His Court—Muhlbach	1
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History of Europe—Allison	2
History of Europe, abridged—Allison	1
Plutarch's Lives	1
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HISTORY AND BIOGRAPHY—Continued:	
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History of Finance—White	1
Lectures on the History of France—Sir J. Stephen	1
History of France—Michelet	2
History of France, 1661 to 1715—Martin	2
History of Ten Years, 1830 to 1840—Louis Blanc	2
Thiers' French Revolution	2
Joseph the Second and His Court—Muhlbach	1
History of the Eighteenth Century—Schlosser	8
History of Germany—Kohlrausch	1
Philip the Second—Prescott	3
Robertson's Charles the Fifth—Prescott	3
History of Civilization in England—Buckle	2
Florence of Worcester's Chronicle	1
Queens of England	2
History of England—Macauley	8
History of the Four Georges—Smucker	1
Constitutional History of England—Hallam	3
The English Constitution—Creasy	1
Hume's History of England	6
History of Civilization—Guizot	4
Froude's History of England	10
Confidential Correspondence of Napoleon with his Brother Joseph	2
Hallam's Middle Ages	3
History of Henry the Fifth—Towle	1
History of Rome—Arnold	1
Digest of Ancient and Modern History—Dew	1
Adams' Roman Antiquities	1
Life and Letters of Cicero	1
Boswell's Johnson	1
Life of Cicero—Forsyth	2
Lives of the British Historians	2
Life of Carl Ritter—Gage	1
Jules Cæsar.—by Napoleon	2
Lives and Times of the Chief Justices—Flanders	1
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Livingstone's Travels and Researches in South Africa	1
Monasteries of the East—Curzon	1
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Leo Tenth; Life and Pontificate—Roscoe	1
Letters from Spain—Bryant	1
Letters from Switzerland—Prime	1
Junius—the Mask of Lord Chatham—W. D.	1
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Lieut. Gen. Scott—Autobiography	2
Naval Life—Lieut Lynch	1
Amos Lawrence—Diary and Correspondence	1
Literary Life of J. K. Paulding	1
The Chaplains and Clergy of the Revolution—Headley	1
Life of Benj. Silliman—Fisher	2
Life of Washington—Edward Everett	1
Francis Wayland; Memoir of Life and Labors—by his sons	2
Archibald Alexander; life—J. W. Alexander	1
Living Orators in America—Magoon	1
Land and Lee—W. Colton	1
Three Years in California—W. Colton	1
Sea and Sailor—W. Colton	1
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Jefferson's Complete Works	7
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History of the Rebellion; its Authors and Causes—Giddings	1
The Great Rebellion—J. T. Headley	1
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Last Years of Henry Clay—Colton	1
John Randolph; Life	1
Planting and Training of the Christian Church—Neander	1
History of the Christian Church—Schaff	3
History of the Christian Church—DeHass	1
Ecclesiastical History—Marsh	1

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The Student's Hume	1
The Student's Gibbon	1
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Liddell's History of Rome	1
Manual of Ancient History—Schmitz	1
Life and Epistles of St. Paul—Conybear and Howsan	2
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Charles XII—Par Voltaire	1
Life of our Lord—Andrews	1
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Natural History of New York	21
Geological Survey of Wisconsin, Iowa and Minnesota—Owen	1
Chemistry, as applied to the Arts and Manufactures—Muspratt	2
Mammals of North America—Baird	1
Birds of North America—Baird, Cassin and Law	2
System of Geology—Dr. Ure	1
Principles of Geology—Lyell	1
Mineralogy—Dana	1
Origin of Species—Huxley	1
Mind in Nature—Clark	1
Structure of Animal Life—Agassiz	1
Animal Kingdom—Cuvier	1
Gregory's Organic Chemistry—Sanders	1
Gregory's Inorganic Chemistry—Sanders	1
Conchological Manual—Sowerby	1
Philosophy of the Mechanics of Nature—Allen	1
Meteorology and Tables—Loomis	1
Phisiology of Man—Flint	2
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Pre-Adamite Earth—Harris	1
Religion and Chemistry—J. P. Cook	1
Chemistry and Electricity—Rolfe and Gillet	1
Phisiology and Health—Jarvis	1
Text Book on Physiology—Draper	1
Races of the Old World—Brace	1
Great Facts	1
Study of Art—Dwight	1
Mechanical Theory of Storms—Basnett	1
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Ancient Literature and Art—Sears, Edwards and Felton	1
Chemistry of Common Life—Johnston	2
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Man's Place in Nature—Huxley	1
Popular Astronomy—Prof. Mitchell	1
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My Schools and Schoolmasters—Hugh Miller	1
Foot Prints of the Creator—Hugh Miller	1
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Testimony of the Rocks—Hugh Miller	1
Popular Geology—Hugh Miller	1
Cyclopedia of Geography—Callicott	1
Knowledge is Power—Knight	1
Plurality of Worlds—Introduced by Edward Hitchcock	1
Smithsonian Reports, 1863-4, 1864-5 and 1865-6	3
Heat a Mode of Motion	1
Corelation of Forces	1
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The Book of the Garden—McIntosh	2
Loudon's Horticulturist	1
Loudon's Villa Gardener	1
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Illustrated Horse Doctor—Mayhew	1
Agricultural Chemistry—Davy	1
White's Farriery—Rosser	1
Youatt on Sheep	1
North America; its Agriculture and Climate—Russell	1
Michigan. Board of Agriculture, 1865	1
Report Department of *Agriculture, 1866—five copies*	5

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Essays—Agricultural and Literary—Gray	
Rural Chemistry—Solly	
Wet Days at Edgewood—D. G. Mitchel	
American Fruit Book—Cole	
Agricultural Chemistry and Geology—Johnston	
Sorgho and Imphee—the New Sugar Canes—Olcott	
Western Fruit Book—Hooper	
Rural Studies—D. G. Mitchell	
Land Drainage—Klippart	
Hedges and Evergreens—Warder	
Honey Bee—Langstroth	
Huish on Bees	
The Wheat Plant; its Culture, etc.—Klippart	
Organic Chemistry of Agriculture and Physiology—Liebig	
Natural Laws of Husbandry—Liebig	
Insects Injurious to Vegetation—Harris	
Grasses and Forage Plants—Flint	
Report Department of Agriculture, 1864–67	
Milch Cows	
American Poultry	
GENERAL LITERATURE:	
New American Cyclopedia	
Annual Cyclopedia	
Cyclopedia of Anecdotes of Literature and Fine Arts—Awine	
Spectator	
Wedgewood's Etymology—Marsh	
English Literature and Language—Craik	
Modern Philology—B. W. Dwight	
Cyclopedia of Literature and the Fine Arts—Ripley & Taylor	
Cowper's Works	
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Bryant—Bryant	
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DeQuincy's Writings	
Plato—Translated	
Quarterly Review	
North American Review—1856 to 1859	
Bay Path—Holland	

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A Complete Manual of English Literature—Shaw, Smith and Tuckerman	1
Rienzi—E. Bulwer Lytton	2
Essays in Biography and Criticism—Bayne	2
History of the English Language—Marsh	1
Educational:	
Practical Astronomy—Loomis	1
Treatise on Astronomy—Loomis	1
Astronomy—Rolfe & Gillet	1
Outlines of Astronomy—Herschel	1
Elements of Astronomy—Brocklesby	1
Analytical Geometry and Calculus—Loomis	1
Analytical Geometry and Calculus—Davies	1
Elements of Algebra—Loomis	1
Geometry—Loomis	1
Trigonometry—Loomis	1
Logarithms—Loomis	1
Preparatory Latin Prose Book—Hanson	1
Latin Grammar—Bullion & Morris	1
Latin Lessons—Morris & Bullion	1
Cicero	1
Cicero de Officus Orations	1
Arnold's Latin Prose Composition—Spencer	1
Quintus Curtius Rufus—Crosby	1
Quintilian—Frieze	1
Horatius	1
Tacitus' Germania and Agricola	1
Tacitus' Histories	1
Hand Book of Latin Poetry—Hanson & Rolfe	1
Livy—Lincoln	1
Xenophon's Cyclopedia	1
Xenophon's Anabasis	1
Xenophon's Anabasis—first three books—Boise	1
Greek Grammar—Crosby	1
Greek Prose Composition—Boise	1
Baillon's Greek Grammar—Kendrick	1
First Greek Book—Harkness	1
Plato's Apology and Crito—Tyler	1
Greek Lessons—Crosby	1
Greek Tables—Crosby	1
Greek Grammar—Hadley	1
French Grammar—Knapp	1
French Reading Book—Knapp	1
French Grammar and Key—Magill	2
Dramatic French Reader—Collon	1
Elementary French Reader—DeFivas	1
Classical French Reader—DeFivas	1
New Method in French—Keetel	1
Corinne ou l'Italie—Madame DeStael	1
French Grammar—LeDru	1
French Reader—LeDru	1
French Fables—LeDru	1
French Reader—Magill	1
Modern French Reader—Rowlan	1
Complete French Class Book—VanNoman	1
German Grammar—Ahn	1
Practical German Grammar—Eichhorn	1
Elementary German Grammar—Worman	1
German Reader—Oehlshlager	1
German Grammar—Peissner	1
Elements of Rhetoric—Whately	1
Rhetoric—Boyd	1
Recent Progress of Astronomy—Loomis	1
Elements of Natural Philosophy—Rolfe & Gillet	1
Natural Philosophy—Quackenboss	1
Human Physiology—Hooker	1
Mineralogy and Geology—Hooker	1
Elements of Geology—St. John	1
Natural History—Hooker	1
Text Book on Chemistry—Draper	1
Principles of Chemistry—J. A. Porter	1
Youman's New Chemistry	1
Chemistry—Hooker	1
Key to Guiot's Wall Maps	1
Key to Sherwood's Outline Maps	1

Titles of Books.	No. Vols.
Educational—Continued:	
Elementary Algebra—Davies	1
University Algebra—Davies	1
Surveying—Davies	1
Logic of Mathematics—Davies	1
Outlines of Mathematics—Davies	1
Dictionary of Mathematics—Davies & Peck	1
Analytical and Practical English Grammar and Introduction—Bullion	2
Higher Arithmetic—Schuyler	1
University Arithmetic—Davies	2
Elementary Geometry and Trigonometry—Davies	1
Elements of Logic—Whately	1
Principles of Zoology—Agassiz and Gould	1
Course of Ancient Geography—Schmidt	1
Manual of Ancient Geography—Schmitz	1
Common School Geography—Guiot	1
Classical Atlas—Long	1
Universal Atlas—Mitchell	1
Normal Methods of Teaching—Holbrook	1
Roads and Railroads—Gillespie	1
History of Education—Philobiblius	1
Palmer's Bookkeeping	1
Spiers' & Surrenne's French Pronouncing Dictionary	1
Latin-English Dictionary—Bullion	1
Fowler's English Grammar	1
Cushing's Manual	1
Virgil's Æneid—Frieze	1
Natural Philosophy—Draper	1
Natural Philosophy—Hooker	1
Natural Philosophy—Loomis	1
Davies' Legendre	1
Anglo-Saxon Grammar	1
Geographical Studies—Ritter	1
Philosophical:	
Principles of Biology—Herbert Spencer	2
Culture Demanded by Modern Life—Youmans	1
Lectures on the True, Beautiful and Good—Cousin	1
Biographical History of Philosophy—Lewes	2
History of Modern Philosophy—Cousin	2
Cousin's Elements of Psychology—Ed. Henry	1
Philosophy of Sir Wm. Hamilton—Wight	1
Metaphysics and Logic—Lectures by Sir Wm. Hamilton	2
History of the Inductive Sciences—Whewell	2
Dymond's Essays on Morality	1
History of Philosophy—Schwegler's—Seelye	1
Elements of Moral Philosophy—Winslow	1
Intellectual Philosophy—Wayland	1
History of Rationalism—Hurst	1
History of Free Thought—Farrar	1
Elements of Morality—Whewell	2
Paley's Moral and Intellectual Philosophy	1
Intellectual Philosophy—Alden	1
Recent British Philosophy—Masson	1
Moral Philosophy—J. R. Boyd	1
Prolegomena Logica—Mansel	1
Influence of the History of Science, etc. (Lecture)—Whewell	1
Social Statics—H. Spencer	1
Moral Science—Wayland	1
Lectures on Moral Science—Hopkins	1
Essays on the Supernatural Origin of Christianity—Fisher	1
Natural Theology—President Chadbourne	1
Limits of Religious Thought—Mansel	1
Butler's Analogy—Ed. Crooks	1
Liber Librorum	1
Hugh Miller's Headship of Christ	1
Critical, Doctrinal and Homiletical Commentaries on New Testament—Lange	4
Guizot's Meditations on Christianity	2
Nature and the Supernatural—Bushnell	1
Theory and Practice of Teaching—Page	1
The Teacher and the Parent—Northend	1
Law and Politics:	
Science of Government—Alden	1
International Law—Woolsey	1
Story on the Constitution	1

Titles of Books.	No. Vols.
Law and Politics—Continued:	
Colton's Public Economy	1
The Constitutional Convention—Jameson	1
Ancient Law—Maine	1
Blackstone's Commentaries	2
Principles of Political Economy—Mill	2
Commercial Law—Bryant and Stratton	1
Canning's Select Speeches	1
Legislative and Executive Documents, Reports, etc	264
American Archives and State Papers	26
Reports of the Patent Office—1863-4-5	3
Congressional Globe	3
Number of volumes	1,092

ILLINOIS AGRICULTURE.

In view of the limited means at the disposal of the Trustees, upon their first organization, the Corresponding Secretary undertook to gather together, by circulars, such an amount of scientific and practical information as might give to this first report a direct economical value to farmers and others into whose hands it might come. With this intent the following circular was issued:

ILLINOIS INDUSTRIAL UNIVERSITY.
OFFICE CORRESPONDING SECRETARY, BOARD OF TRUSTEES,
Alton, *Dec.* 1, 1867.

DEAR SIR:

In order to obtain for the Annual Report of the Board of Trustees of the Illinois Industrial University reliable statements of the results of the experience and observation of practical *farmers* in all parts of this State, the following queries are addressed to yourself and others, in the hope that you will find it convenient to communicate any information you may possess upon one or more of the topics named, as well as concerning any other subjects that you may deem of value to the agricultural interests of our State.

Five thousand copies of the Report, in which we wish to embody your suggestions, will be printed and distributed at the expense of the State; and we hope that you and others will avail yourselves of this opportunity to improve the methods of agriculture by a wide distribution of the practices of our best farmers.

Address, W. C. FLAGG, *Cor. Sec.*, Alton.

J. M. GREGORY, *Regent.*

1. What is the location of your farm by section, township and range; its distance from market town or shipping point?

2. Character of surface soil, as to depth, color and consistency; of subsoil, whether clay, sandy, or gravelly: natural growth, whether prairie or forest, with varieties of plants and trees growing spontaneously.

3. Number of acres in your farm: number in cultivation: number in woodland or wild pasture: division of fields: rotation of crops?

4. When was your farm first put in cultivation: kind of crops taken off: to what extent does the soil seem exhausted by cultivation: have you used manures, and, if

so, with what results: your experience in deep ploughing, and its effect on soil and crops: best plows or other implements for breaking up ground.

5. Grasses, Clovers, etc.—What do you find most suitable varieties for pastures and meadows: mode of seeding and quantity sown per acre: largest and average yields of meadow lands: average number of live stock of different sorts pastured per acre: experience in top-dressing meadows and its effects: stage of growth at which grasses, etc., are best cut for hay: implements preferred for hay-making.

6. Grains.—Best varieties of corn, wheat (fall or spring), oats, rye, barley, buckwheat, etc., that have been tried in your neighborhood: the best time and method of preparing ground for each of the small grains: time and method of planting or sowing: drills, sowing machines or planters that you have tried and found best: best harrows and rollers: cultivation of corn, with the kind of implements used: experience, if any, in cultivating wheat by horse-hoe, or otherwise: time of cutting up corn: method and implements: time of cutting small grains: reaper or header employed: practice in shocking, stacking or putting small grains in barn: largest and average yield: insects and diseases, and methods of subduing them.

7. Root Crops.—Best varieties of Irish and sweet potatoes, turnips, beets, and carrots: time and method of preparing ground: mode of planting, method and means of cultivation: largest and average yield: methods of digging and keeping: cost and value as compared with grain crops for feeding: insects and diseases.

8. Legumes.—Best varieties of peas and beans: their management: cost and value as feed crops.

9. Textile Plants.—Your experience with flax, hemp and cotton: best varieties, method of planting, cultivating, etc.: value as a farm crop.

10. Ground Plants.—Pumpkins, squashes, watermelons, etc.: management, cost and value as a field crop: insects and diseases.

11. Miscellaneous.—Hops, tobacco, broom corn, sorghum, onions, chiccory: growth, management and value as farm crop.

12. Orchard Fruits.—Apples, pears, peaches, cherries: preferred varieties for various purposes: preparation of ground: planting, cultivation and pruning: gathering and keeping of fruit: packing for market: fruit houses and cellars: value of orchard products as a farm crop: insects and diseases.

13. Small Fruits.—Grapes, currants, gooseberries, blackberries, raspberries, strawberries: varieties preferred: mode of preparing ground: planting, cultivation, pruning, draining and gathering: value as a farm crop: insects and diseases.

14. Woodlands and Timber Plantations.—Experience in forestry: in management of woodlands, or in growing timber trees from seeds or young trees: value as a crop and as shelter for crops and animals.

15. Live Stock.—Cattle, horses, mules, sheep, swine; breeds preferred: breeding of each: rearing and training: dairy management: fattening of animals: wool growing: management of manures: diseases.

16. Other Domestic Animals.—Poultry, bees, silkworms, etc.: best breeds: rearing and management: diseases.

17. Rural Architecture, etc.—Houses, barns, (for hay and grain and different kinds of stock,) root and fruit houses, etc.: the materials preferred; best arrangement for economy of labor and comfort.

18. FENCES.—Material preferred: cost per rod, and cost of keeping up hedge, board and rail fences: value of hedges for protection: is it cheaper to fence out stock than to keep them up?

19. Capital per acre required for good farming?

Thirty-four answers were received, which are arranged according to latitude, beginning with the northernmost counties, for facility in comparing the opinions of those in the same latitude.

Answers were received from the following persons:

E. Moss, Belvidere, Boone county; Geo. Chaffee, Belvidere, Boone county; M. A. McConnel, Richmond, McHenry county; Asa Baley, Lindenwood, Ogle county; Silas Reynolds, Aurora, Kane county; D. C. Scofield, Elgin, Kane county; Joseph Tefft, Elgin, Kane county; H. Pierce, Moline, Rock Island county; Jacob Schoenleber, Allen, LaSalle county; Charles E. Barney, Providence, Bureau county; Verry Aldrich, Tiskilwa, Bureau county; Adam Rankin, Monmouth, Warren county; George W. Minier, Mackinaw, Tazewell county; James Robinson, Tremont, Tazewell county; John R. Tull, Pontoosuc, Hancock county; Thos. Gregg, Hamilton, Hancock county; A. C. Hammond, Warsaw, Hancock county; Harvey Sodowsky, Indianola, Vermilion county; William M. Allen, Mt. Pulaski, Logan county; Samuel P. Boardman, Lincoln, Logan county; B. Sweet, Tuscola; George Harding, Bloomfield, Edgar county; G. W. Vaughan, Sullivan, Moultrie county; Sylvester Butler, Majority Point, Cumberland county; W. F. Bliss, Nokomis, Montgomery county; D. Gove, Carlinville, Macoupin county; J. G. Swann, Elsah, Jersey county; E. A. Riehl, Alton, Madison county; John Balsiger, Highland, Madison county; J. Y. Bothwell, Clay City, Clay county; Theodore Engelman, Mascoutah, St. Clair county; George C. Eisenmeyer, Mascoutah, St. Clair county; Joseph Barber, Richview, Washington county; Joseph Warder, Vienna, Johnson county.

The following statements, in answer to the first and second queries, show the conditions of farming which call out the differing opinions.

1. What is the location of your farm by section, township and range: its distance from market town, or shipping point?

E. Moss.—One mile south of Belvidere.

G. Chaffee.—Two and one-half miles from depot at Belvidere.

M. A. McConnell.—One-half mile from Richmond Station.

Asa Baley.—Six miles from Rochelle, fourteen from Rockford.

H. Pierce.—One-half mile from Moline, three from Rock Island, four from Davenport.

Joseph Tefft.—Five miles west from Aurora on the C. B. and Q. R. R.

J. Schoenleber.—Location of farm: section 9, township 31, range 5, southeast quarter, eleven miles from canal and railroad in Seneca.

V. Aldrich.—Location of farm: section 23, township 15 north, range 1 east, 4th principal meridian. Distance from shipping points: from Hennepin, on Illinois river, five miles; Henry, on Illinois river, thirteen miles; Tiskilwa, on Chicago, Rock

Island and Pacific railroad, five miles; Bureau Junction, three miles; Princeton, on Chicago, Burlington and Quincy railroad, nine miles.

A. Rankin.—Location of farm; section 31, range 2 west of 4th principal meridian, Monmouth township, one mile and a half from the depot.

G. W. Minier.—My farm is northeast quarter of section 8, town 23 north, range 2 west of the third principal meridian; three and a half miles due north of Minier Station, on the St. Louis, Jacksonville and Chicago railroad.

J. Robinson.—My farm is located in section 10, township 24 north, range 4 west of the third principal meridian, in Tazewell county, Illinois, and is distant seven miles from Pekin, on the Illinois river.

J. R. Tull.—My farm is located in south half of section 7, township 7 north, of range 7 west of the fourth principal meridian, Hancock county, Illinois. It is two miles from a shipping point, and four miles from a market town.

Th. Gregg.—My farm or fruit lot is located in the city limits of Hamilton, on section 29, township 5 north, range 8 west of the fourth principal meridian, in Hancock county, at the foot of the Lower Rapids, and opposite Keokuk, Iowa, from which it is distant one and a half miles, including the river. Keokuk and Warsaw, five miles below, are our shipping points by river, Hamilton by rail.

A. C. Hammond.—My farm is situated in township 4 north, ranges 8 and 9 west, four miles from Warsaw.

Harvey Sodowsky.—My farm is situated on the Little Vermilion river, being in sections 17 and 18, township 17, range 12 west. I am half a mile north of Chillicothe and ten miles south of the Great Western railroad. Fairmount and Catlin are my nearest shipping points. I am some twenty miles west of the Wabash river.

Wm. M. Allen.—Section 8, township 18 north, 1 west. Shipping point Lincoln, distant twelve miles.

S. P. Boardman.—That my farm consists of the west half of section 29, the east half of section 30, the southwest quarter of section 20, and the southeast quarter of section nineteen, all the tracts being in town 20, range 1 west of third principal meridian. It is six miles and a half from Lincoln, the county seat of Logan county, and my market town.

G. Harding.—Farm located in township 15 north, range 12 west, twelve miles from Paris.

G. W. Vaughan.—Part of my farm is in section 3, township 13, range 5, and the rest in sections 27 and 34, 14 south east, third principal meridian. Its distance from a shipping point by rail is twelve miles, but the best shipping point, and that to which we usually take our grain, is Mattoon, 18 or 20 miles distant. My farm is one and a half miles from Sullivan, the county seat of our county.

S. Butler.—My farm lays lengthwise, east and west, section 9, township 10, range 9, E.

W. F. Bliss.—Montgomery county; section 21, in township 10 north, range 2 west, one mile west of Nokomis, which is its shipping point, and 81 miles from St. Louis on the St. Louis and Indianapolis railway.

D. Gove.—My farm is located in sections 9 and 10, in township 10, range 7, Macoupin county; is two miles and a half north of Carlinville, the county seat of Macoupin county.

J. G. Swann.—Township 6, range 11, two miles from Elsah, on the Mississippi river.

E. A. Riehl.—Northeast fr. quarter section 25, township 6, range 11, and the east half of the northwest fr. quarter section 25, township 6, range 11 west, third meridian, eight miles from Alton by road.

J. Balsiger.—My farm lies in Madison county, sections 35 and 36, township 4, range 6. It is two and one-half miles from Highland, our market town, which will also be our shipping point, a railroad being built from there to St. Louis, as well as eastward.

J. Y. Bothwell.—My farm lies in sections 13, 14, 23 and 24, township No. 3 north, range No. 7 east, on the Ohio and Mississippi railroad, two miles from Clay city.

T. Engleman.—My farm is in sections 19 and 20, township 1 south, range 6 west of third principal meridian. It is four miles south of Mascoutah, a town of about 4,000 inhabitants and with five steam flouring mills to which the wheat, the only product of the farm raised for market in this section of the country, is sold. Prices of wheat at Mascoutah average ten or fifteen cents per bushel below St. Louis market prices; competition and jealousy between the mills keeps the prices up at times equal to those in St. Louis.

J. Barber.—The location of the farm is section 10, township 2 south, range 1 west of the third principal meridian, in Washington county. Shipping point, Richview Station, one mile distant.

J. Warder.—My farm is located in that part of Illinois known as the White and Black Oak Ridges, south of the prairie region. Our nearest shipping point is Metropolis, on the Ohio river, twenty miles distant. Our nearest market town is Vienna, Johnson county, six miles west of us. Douglass on the Illinois Central railroad, twenty-five miles distant, is our nearest railway station.

2. Character of surface soil, as to depth, color and consistency: of subsoil, whether clay, sandy, or gravelly: natural growth, whether prairie or forest, with varieties of plants and trees growing spontaneously?

E. Moss.—Common prairie, black color, mixture of black sand; subsoil gravelly.

G. Chaffee.—Prairie, with clay subsoil.

M. A. McConnell.—Surface somewhat rolling; soil varies, some clay and gravel; prairie, openings and timber; the timber is hickory, red and white oak; openings, burr oak.

A. Baley.—Surface soil black, one foot deep, light prairie; subsoil open yellow loam; can be worked at all times, when no frost is in it.

H. Pierce.—Surface soil, dark, yellowish clay loam, 8 to 18 inches deep; natural growth, oak, hickory, walnut, soft maple and a few butternuts.

J. Tefft.—Upland soil, clay with some portion gravelly; bottom, black, deep clay soil, full of alluvial deposits.

S. Reynolds.—Surface soil, dark loam; subsoil, various. Prairie, covered with common prairie grass.

J. Schoenleber.—Surface soil, black loam, 12 to 30 inches deep; rolling prairie; subsoil, yellow clay from 3 to 6 feet; below this, blue clay to the depth of 38 feet dug and 44 feet bored.

C. E. Barney.—Prairie; a deep black, sandy loam; clay and gravel subsoil.

V. Aldrich.—Surface soil, clayey loam to the depth of 10 or 12 inches; color, brownish black, or between black and light cold clay soil, mixed with just sand enough to render it pliable and easy to work; it takes in water freely and stands drouth well. This description includes south half of farm, formerly prairie. The natural growth of north half is hazel brush and barren timber, black and white oaks; soil becomes lighter color and more clayey Subsoil of south half, mostly red or brick cold clay to the depth of 15 feet; below this, to the depth of 15 feet or more, a layer of coarse gravel, and then river sand as far as I have penetrated, about 61 feet.

A. Rankin.—Surface soil, black loam, average depth, 20 inches; subsoil, clay. Prairie, spontaneous growth grasses, blue stem prairie grass, blue grass, and white clover.

G. W. Minier.—The surface is slightly undulating. a very little of it may be said to rise to the dignity (?) of a roll, passing off into gentle slopes.

The soil is the common dark mould of the prairies of this part of the State; depth of soil is usually said to be from one to two feet, but I am satisfied it is nearer from one to two hundred feet, as it is all an immense drift, and any depth to which I have yet penetrated, when exposed to the action of the elements, produces well. The subsoil is generally yellow clay. It was nearly all prairie, producing in its natural state, when I first saw it, an immense crop of wild grass and rosin weeds. About ten acres of it was a copse, now a beautiful grove of burr oak, red elm, white hickory, sassafras, blue ash, hackberry, and wild cherry, with here and there a mul-berry and one honey locust.

J. Robinson.—The character of the surface soil is black loam mainly, with some black sand near the surface, and yellowish or reddish clay mixed with it; this extends from one and a half to three feet in depth. The subsoil consists of a yellowish and reddish clay, with sand and gravel, sometimes mingled and sometimes in veins or layers; sometimes clear beds of sand or gravel are found from ten to twenty-five feet from the surface, in which usually is found pure hard water; below this is the blue clay, which extends to an unknown depth.

The natural growth on this land, before cultivation, was the wild herbage of the prairie, and since being cultivated, if let alone, would be the various weeds that infest our prairie farms; these would soon be followed by thistles and briars, and they, if the land was not pasture, by our various timbers, such as cottonwood, red and white elm, ash, wild cherry, maples, locusts and box elder; if the land be pasture it would soon be blue grass and white clover.

J. R. Tull.—The soil is mostly thin; subsoil is a clayey loam, underlaid with limestone, and is what might be termed a limestone soil. My farm is partly timber and part prairie. The natural growth of timber is mostly black oak, some hickory, white oak, ash, black walnut, sugar maple and linden.

T. Gregg.—Our surface soil is a vegetable mould overlying a clay subsoil; beneath which is, first, a deposit of sand some fifteen feet thick, and, second, a tenacious bluish clay, beneath which, again, is limestone rock. Most of the bluffs in this vicinity contain valuable quarries of a beautiful building stone, specimens of which, together with samples of soils, I send for the museum of the Industrial University.

The natural growth of timber on these bluffs consists of the following, viz: white and black oak, hickory, white and sugar maple, wild cherry, elm, honey locust, mulberry, ash, sassafras, hazel, and blackberry and raspberry.

A. C. Hammond.—Soil, a dark clay loam, from ten to twenty inches deep; subsoil a tenacious yellow clay. Natural growth, hazel, crab apple, and wild plum.

The surface, rolling and well drained by several streams. The soil varies from one to three feet in depth and is bedded on a very strong yellow clay; it is slightly sandy with very little gravel. The natural growth is part forest and part prairie; about 130 acres forest and the rest prairie. The forest trees are the black walnut, sugar maple, wild cherry, blue ash, hickory, elm, mulberry, coffee nut, pawpaw, and some honey locust plants.

H. Sodowsky.—Surface, black mould two feet in depth; subsoil, clay; farming land, prairie.

S. P. Boardman.—The surface soil is a warm, light-colored soil—as compared with the blackest soil of this part of the State—having sufficient sand in it to show a little on the surface after a rain. It is about fifteen to seventeen inches in depth. Deer creek, a small branch of Salt creek, runs across the farm diagonally, entering at the northeast corner and passing out on the west line of the farm, within less than a half mile of the southwest corner. High, rolling prairie wholly on the east side, and level bottom land on the west side of the creek. This "Deer Creek Bottom" is a mile in width, and differs from creek bottoms generally, in that, instead of the soil being of great depth, it is comparatively shallow, being mixed with small pebbles from the size of a pea to an ounce ball.

The subsoil of the high prairie, as well as of the bottom prairie, is clay, but the subsoil of the creek bottom is whiter, and of a firmer consistency than that of the upland.

The natural growth of the entire farm, with the exception of a small fringe of willows along the creek, is prairie grass.

G. Harding.—Surface soil, a rich black loam 18 inches deep; subsoil, yellow clay. A great deal of rosin weed growing spontaneously before breaking the sod; afterwards cottonwood trees.

G. W. Vaughan.—A very dark loam, from 12 to 18 inches deep. The soil of the flat land is much deeper and darker colored than that of the rolling land, which is more mixed with gravel and sand. The level land, of which most of my farm consists, lasts much better than that which is rolling, but is not so agreeable to till in a wet season, like that just passed. My farm is all prairie, and its natural growths are various kinds of weeds, grasses and the cottonwood tree.

S. Butler.—Prairie; surface soil of a dark color, to a tolerable depth; subsoil of a sandy clay.

D. Gove.—The soil is a vegetable loam, slightly mixed with sand, and is from 1½ to 3 feet deep; the subsoil is clay, with some gravel. The natural growth of the prairie is the same as is common in Central Illinois, and as soon as fed heavily by stock it kills out, and blue grass makes its appearance spontaneously. The timber land is covered with black walnut, elm, hickory, and the different species of oaks, cherry, etc.

J. G. Swann.—Yellowish clay, 12 inches in depth; forest growth, common sedge grass, hickory, black and white oak.

E. A. Riehl.—Character of soil, varied; surface broken, as the bluffs on the Mississippi river usually are. Soil rather sandy than otherwise, though in spots it is clayey. Part is bottom land. Natural growth, timber—hickory, oak, sassafras, mulberry, ash, sumac, red-bud, etc.

J. Balsiger.—The surface soil is a black or brown loam, consisting of humus more or less mixed with clay and some little sand; this layer is of unequal depth, in some places in the lower parts of the farm two feet and more, and on the higher parts less deep. The subsoil is a red, and in some places a white or gray clay. The natural growth is timber, although Looking Glass Prairie is not far off, consists of oaks—white, black, overcup, burr, spanish, red, laurel, black-jack, post-oak—hickory, black-walnut, honey-locust, sycamore, red and white elm, mulberry, wild cherry, crab-apple, cottonwood, wild plum, red-bud, sassafras, white ash, willow, hackberry, liquid amber, red maple, persimmon, white thorn, hazel and grape vine.

J. Y. Bothwell.—Surface soil, dark gray from 8 to 10 inches deep; subsoil, yellow clay. Mostly prairie; some brush land brought into cultivation; growth on brush land consists of pin oak, cherry, mulberry and elm; hazel and blackberry undergrowth.

T. Engelmann.—My farm is situated on an elevation near the southern end of Looking Glass Prairie. The slopes of the elevation were originally covered with forest, and are so yet, to a small extent. The prairie, which stretched from the foot of the elevation north and south for many miles, has entirely disappeared, and has made room for large fields; not one square foot of original prairie is to be found within many miles. The slopes of the elevation were overgrown with a great variety of trees and plants; principal among which were hazel, blackberries, sumac, sassafras, wild grapes, plums, persimmons and wild cherry, also several varieties of oak and elm. The surface soil is a dark mould, from 10 to 20 inches deep. The subsoil on the slopes of the hill is heavy red clay, sparsely mixed with sand. In what formerly was prairie the subsoil is gray clay, well mixed with sand.

J. Barber.—The soil is a dark loam, somewhat sandy, and about 12 inches in depth. The subsoil is a hard clay and greatly inclined to wash. Natural growth, what is usually found on the prairies of our State.

J. Warder.—The principal geological formation in our section is a very heavy body of sand-stone, with occasional changes to limestone. The face of the country is roughly broken, the slopes are steep and rocky, with precipitous cliffs near the streams. The tillable soil is mostly confined to the ridges, which may be compared to small plains or table-lands. These are in many places level and beautiful. The soil is light brown in color, slightly sandy and warm. At a depth of some inches it becomes more loamy, and at a greater depth is underlaid with yellow clay or loam, and below that sand and gravel. These lands have a perfect surface drainage. They may be plowed very soon after a rain, or they may be cultivated early in the spring. They are well adapted to sustaining severe drouths. This is owing, I think, to the fact that the plant roots reach that deep, moist substratum which underlies the surface soil.

That this deep, open and moist substratum does exist, is proven by the magnificent growth of timber, mostly of deep-rooting species, as follows: Yellow poplar, black walnut, white oak, black oak, hickory, sugar maple, black gum, hazel, etc.

The labor of clearing has been immense, and much good timber has been wasted by girdling trees and leaving them for time to do its work. These stand in the

fields from five to ten years, are ploughed around and hoed around, their great roots stretching out on all sides, proving a great draw on time and temper, yet there they stand—those giants of the forest—stretching out their naked arms in a solemn, threatening manner, till some boisterous day they come down with a terrible crash. It is clear then that in this region we will not need many reapers and mowers, at least for some time to come. Wheat we do not consider a paying crop; however, the most of farmers raise for home consumption, with some surplus. Corn is our great staple; next to that, tobacco. Cotton was planted extensively during the war, but is now almost given up. I have also raised oats, rye and buckwheat, with different degrees of success. Our soil seems to be more peculiarly adapted to the culture of fruit, and also of vegetables—those of a bulbous nature in particular—as sweet potatoes, onions, beets and turnips. This is owing to the warm, sandy soil, with the open and moist substrata, to which is ascribed, as before mentioned, the growth of deep-rooted forest trees. This physical constitution of the soil causes that adaptation for the vigorous growth not only of fruit, but for all other species of trees.

3. Number of acres in your farm: number in cultivation: number in woodland or wild pasture: division of fields: rotation of crops?

E. Moss.—120 acres.

G. Chaffee.—160 acres; 60 to 80 in corn and oats annually; remainder in pastures and meadow; sow oats after corn.

M. A. McConnell.—690 acres; 500 in cultivation; 100 in openings, all grown up. White clover in pasture, and has been for 30 years. Farm is divided into fields of from 25 to 40 acres, *except* where cattle run.

Asa Baley.—40 acres in four fields; two years in grain, two in grass. First after grass is corn; second crop is small grain with grass seed.

H. Pierce.—16 acres in cultivation (Nurseryman); corn, sorghum, or potatoes for first crop, followed by barley. Usually corn is planted for a number of years, and then wheat to seed down with.

J. Tefft.—242 acres, all under fence; only about 15 under the plow; woodland and wild pasture, 100 acres.

J. Schoenleber.—160 acres; 96 acres under cultivation; 50 acres timothy meadow; the remainder wild prairie and slough grass. Farm is equally divided by fence; 15 acres enclosed for pasture, horses and cows; 40 acres in clover and timothy, for hogs; 6 acres for orchard and vineyard.

C. E. Barney.—160 acres.

V. Aldrich.—160 acres; 120 acres under cultivation; 40 in woods pasture. Divided into 6 fields. Rotation of crops, wheat, corn, sometimes rye or oats, and then corn. Small grain never does as well the second year on the same field, or after a crop of corn, as it does the first.

A. Rankin.—Farm of 80 acres; plow land 61 acres; pasture 13 acres; orchard and vineyard 16 acres. Sow clover with wheat and oats, and plow it under the next spring for corn. Sow timothy and clover for meadow and pasture; cut it two or three years, and plow under for wheat or corn. Plow in September with second crop on.

G. W. Minier.—I have 160 acres; enough for any man; wouldn't have any more. *All in cultivation* except the woodland, which is in pasture. My farm is divided

into seven fields; this does not include house and barn lots. No one can possibly farm to profit and keep his land in good tilth, without a rotation of crops; and by rotation of crops is not meant what politicians mean by rotation of office, *i. e.* a rolling out of one office into another; but so adapting the various crops that the land shall either have rest, or so as to foster and restore the elements which the former crop had taken from the soil.

J. Robinson.—The number of acres in my home farm is 130 acres. I have under cultivation, by plow, forty acres; in meadow, timothy and red clover, 25 acres; in timothy and blue grass pasture, 10 acres; in apple orchard, 40 acres; in peach orchard, 12 acres; in small fruits, vegetable garden, ornamental trees and house yard, 3 acres. My farm is divided in fields, as follows: two under plow, one in meadow, two in pasture, one in orchard, and one house, garden and ornamental trees.

J. R. Tull.—There are 320 acres in my farm; 135 in cultivation, the balance in timber or woods pasture. The farming land is fenced into six fields, the largest of which contains 35 acres. My crops have been mostly corn; some wheat, oats and buckwheat.

T. Gregg.—Number of acres, 10.

A. C. Hammond.—Number of acres in farm, 150; 50 devoted to horticulture; 50 to grass; 30 to grain, and twenty to woodland.

H. Sodowsky.—I have two farms, containing together 960 acres, in eighteen divisions.

W. M. Allen.—240 acres woodland; 50 acres prairie and timber lying together; 190 acres under cultivation. Land is divided into five fields, besides orchards, etc. Rotation, corn on wheat stubble, wheat on corn, oats stubble or clover.

S. P. Boardman.—My farm proper (not including my timber land, which is separated from it) consists of about 950 acres, of which 640 acres are in tame grass—pasture and meadow—and the remainder under cultivation. I am, however, sowing 160 acres of this latter amount to tame grass, at the time of this writing. My farm is divided into one field of 310, one of 160, one of 150, two of about 120 acres each, and four small fields of from 30 acres to 5 each, used for feed lots. I expect to divide into two fields of equal dimensions, my 310-acre field, which will make as many sub-divisions as I care about, in my present business.

My rotation of crops, in so far as I may be said to have one on a farm which has been "made" from the prairie in ten years, may be called this: to raise not to exceed five crops of grain—of which four shall be corn—on any piece of land, until it is laid down to grass; the grass to be mown a few years, pastured a few more, and then to be broken up for corn.

G. W. Vaughan.—520 acres; 400 in cultivation; 40 in wild pasture, and 80 in wild grass. Part of my lands are divided into 40, 80 and 160 acre lots, and the rest in a large inclosure. This is a common practice among farmers here, yet its only recommendation is that it permits the farmer to make his inside fences of hedge. I generally put my land in corn for a few years, then in oats and then in wheat, breaking up the stubble after each crop is taken off; then I put in corn again.

S. Butler.—Farm of 80 acres; 40 acres in cultivation, and 40 acres in wild pasture. Each 40 is in one field. I have also 40 acres timber, distant one mile and a half.

W. F. Bliss.—320 acres in farm; 175 in cultivation; 40 in wild prairie pasture. To be divided into 8 forty-acre fields, with the following rotation of crops, only partially tried: 1st, wheat; 2d, corn; 3d, oats; 4th, meadow; 5th, meadow; 6th, meadow; 7th, pasture; 8th, pasture; 9th, wheat; 10th, corn; 11th, oats; 12th, meadow; etc.

D. Gove.—My farm contains 650 acres, 570 of which is in the prairie, and in cultivation; 80 acres in timber, which I am having fenced for pasture. The prairie part of the farm is divided into five fields, besides the orchard and timber belts, feed lots, etc. The buildings are very near the centre of the farm, and the arrangement of the fields are such that I can turn stock from the feed lots directly into any one of them, or from one field to another, with convenience. My practice has been not to grow more than two crops of wheat or corn, and only one of oats, without a change; but when in grass I let it lie longer; and especially if it is pastured, as it seems to improve every year as the turf becomes stronger.

J. G Swann.—225 acres; in cultivation, 175; woodland pasture, 50 acres. Five fields. Corn, wheat and clover.

E. A. Reihl.—155 acres; about 40 in cultivation.

J. Balsiger.—My farm consists of 160 acres; half of which are under cultivation; the balance in timber land. The rotation, although not always regularly followed, is: corn, oats, wheat, and timothy or clover. I cultivate the first three crops till I think the land needs rest, and then put in the grass for several years. About one-third of my cultivated land is timothy or clover.

J. Y. Bothwell.—Farm of 400 acres; 375 of which is in cultivation; 200 acres timber. Farm divided into 8 fields. Most of the improvements made since 1851.

T. Engelmann.—My farm embraces 380 acres; 300 acres of which are in cultivation; about 60 in woodland are used as a wild pasture. There is no permanent division of fields, and no rotation in crops. All suitable land is put in wheat, and many fields have yielded ten or more crops of wheat in succession, without any perceptible deterioration in fertility. Corn is raised only for home consumption.

J. Barber.—I have 100 acres, 60 of which are in fruit, the remainder in pasture, meadow, etc.

4. When was your farm first put in cultivation: kind of crops taken off: to what extent does the soil seem exhausted by cultivation: have you used manures, and if so with what results: your experience in deep plowing and its effect on soil and crops: best plows or other implements for breaking up ground?

E. Moss.—1852. Wheat, oats, corn, barley, etc. Soil is strong; have used manure to good effect; consider it valuable. Deep plowing is beneficial.

G. Chaffee.—About 1845.

M. A. McConnell.—Came on the farm in 1837. Have raised all kinds of crops. My farm is as good as when I came on it. I have always used manure and plaster with the best of results. Deep plowing is essential and cannot be dispensed with on a farm.

Asa Baley.—Farm has been under cultivation nine years. Wheat is the principal crop. I have been on the place five years, and have pursued the two years' rotation course, as I have done for thirty years. Under this treatment land will increase in productiveness at the rate of 100 per cent. in fifteen years, if all is done in the best manner—the hay and straw all returned to the land in the form of manure. So far as my observation goes, land will be reduced 100 per cent. if seven crops of wheat are grown in succession. I consider it of great importance to the farm to keep so

much stock on the farm as will consume all the pasture, hay and straw that is grown on the farm.

H. Pierce.—In cultivation two years in potatoes, corn, beans and garden vegetables. Deep plowing is by all means the best. Fields partially subsoiled will show up to the last furrow. We use the Moline plow of Candie, Swan & Co., with subsoil attachment, when we go below 10 inches in depth. Use three cornered or butterfly harrow.

J. Tefft.—In 1842. Corn was the crop mostly raised. The soil does not appear to be exhausted, as it is well manured every year. No experience in deep plowing. Manure pays well for labor.

S. Reynolds.—The farm was first put under cultivation in 1845. The principal crops taken off have been corn, wheat and oats. The first crops were much better than they have been of late years. Have tried deep plowing with poor success. Have used annually manure made from 200 sheep, 20 or 30 horned cattle, 10 or 12 horses, and about 25 hogs, with marked success.

J. Schoenleber.—Farm put in cultivation in 1856. Crops mostly corn, some wheat and oats, once rye and barley. Wheat and oats are not as profitable crops as corn; wheat yields best on new ground; corn does just as well grown on land used before for small grains. I only raise wheat and oats sufficient for home consumption. Corn does not do as well in a dry season. I use the manure produced in stable and yard; on rolling land the result is a double yield of corn. By top-dressing the grass I also procure a double yield. I prefer deep plowing, either in a wet or dry season.

C. E. Barney.—Have sometimes made the mistake of plowing too deep, turning up cold and unproductive dirt 12 to 14 inches deep; do not think any soil would be injured by disturbing the subsoil, if not turned up. In naming manure in order of excellence—sheep, hog, cattle, horse. My experience is that horses and colts make the least return, in value to the soil, for the amount of grass they consume. I consider manure most valuable when used as a top dressing; in September for big grass next year, and big corn the second year.

V. Aldrich.—Farm first put in cultivation in 1846, except 40 acres southwest quarter, which was in cultivation when I came here in 1844, and had been several years before. The first crops, for six or eight years, were corn; then wheat, oats, and rye; sometimes rye two or three years in succession, with good results. Rye seems to exhaust the soil least of any small grain. The soil is becoming gradually exhausted, so that now we do not get over three-fourths the amount of grain per acre we did at first.

I have always saved all my manure from yarding stock nights, constantly through the winter season, and feeding in the yard. In so doing, I make from 100 to 150 loads manure annually, which I generally cart out in the fall; October is the best month. The fall rains soak the strength out of it and carry it into the ground, making it more productive of good results than when applied in the spring, and more especially on meadow land. The hay crop can be nearly doubled by using about 20 loads to the acre. If applied too abundantly the grass will lodge or fall down before time to cut. The same effect is produced on small grain. But for corn no one need to fear; it will grow strong and produce in proportion to the quantity of manure. Even the best black prairie soil is wonderfully benefited by manuring for corn crop. I have never practiced deep plowing any more than can be done with a single furrow. I always plow my land as deep as a good team can do it, by taking

a narrower furrow than most persons use. This pulverizes the soil much finer, rendering it capable of better results for any crops. By plowing a little deeper year after year, I believe the soil will wear much longer, with equal productiveness.

The Moline plow has ranked best in this vicinity heretofore, but now others are considered equally good. Some plows will work well run 3 to 4 inches deep; when we come to put them down 6 to 9 inches they will not scour, and are worthless for that use. For plowing 6 or 9 inches deep the furrow should not be cut over 10 inches wide; then it will break fine by turning, and pulverize much better than with a wide furrow.

A. Rankin.—My farm was first cultivated in 1858. Have raised corn, wheat, rye and oats. Perceive no deterioration of ground upon which there has been a proper rotation of crops; but where there has not been rotation, or manure applied, the ground has been exhausted fifty per cent. I have applied barn-yard manure with good results both to stalk, ground and meadow. But I think the best way to improve the land is to manure the meadow by producing a heavy growth of roots, then plow it up. Deep plowing I find very beneficial by subsoiling in the spring, or trench plowing in the fall.

For rough and soddy ground I prefer the Moline plow—John Deere's; but for stubble growth, I prefer the Canton plow.

G. W. Minier.—My farm was put into cultivation, or began to be, sixteen years ago, in the summer of 1852. I have taken from it wheat, corn, hay, oats, potatoes, flax and barley. "Exhaust the soil in Illinois by cultivation!" That's a good one. You may spoil your lands, by a system of land piracy—everlastingly taking away and never restoring—or by a course of always cropping and never letting your land rest. But by true cultivation the land grows better. Annanias and Sapphira were killed for a less crime than some farmers commit every year with impunity. Of course I use manures; and here I would like to write an essay, but have not time. No lands will pay better results from manures than ours in Illinois. No one ever need be afraid of plowing too deeply. "Best plows!" Excuse me, please, from advertising any one's plow. But give me a good plow*man*, and him I can't just now describe. Permit me to say, however, that in our "learned Institutions!" (Lord have mercy!) after a toil of four years, we dub our young men A. B.; sometimes A. M.; on a little further, M. D. or D. D.; and when the head has become sufficiently bald, then comes L.L. D. And yet, it requires more skill and better training to plow an acre of land, tell its component parts, and the crops best adapted to it, than all the above flummery which we miscall learning.

J. Robinson.—This farm was partly put in cultivation in 1842. The crops taken off have been corn, wheat, oats, rye, barley, fruit, and one or two acres of potatoes annually. The soil, where it has been continually in cultivation, appears to be about one-fourth exhausted; but where it has been in pasture or meadow lately, it is about as good as when new. Very little manure has been applied to the soil, but where it has, with good results. I have plowed to the depth of twelve inches to the advantage of both soil and crops. I have used the Michigan subsoil plow to break meadows and blue grass pasture; one man and four horses or mules breaking two acres or more per day. The Peoria plows and a clipper plow manufactured by T. & H. Smith, of Pekin, work very well in all our soils.

J. R. Tull.—I commenced my first improvement in 1837, and was some fifteen years in opening my farm to its present dimensions. My crops have been mostly

wheat and corn. The soil, where the land is considerably rolling, is very much exhausted; and the best of it is more or less so. I have found that manure, properly applied, is a great benefit. I use all the manure of every description, that I am able to make on the land, and I find that it pays largely. I find that very deep plowing is injurious to my land. A common depth, say 6 to 8 inches, is deep enough.

T. Gregg.—My first clearing was done in the winter of 1858–59, and two acres planted, chiefly to apples and peaches, the following spring. Since then the whole ten acre block has been brought into cultivation, and chiefly planted to those and other fruits. My mode of planting was to clear the ground, as is usually done in the west, and after as good a plowing as I could give it for the roots and stumps, planted the trees without any deeper cultivation. This slovenly mode I have had great reason to regret, however, and were it to do over again, I would find economy in expending fifty dollars per acre in cultivating twenty inches deep, in preference. Garden vegetables, consisting chiefly of Irish and sweet potatoes, beans, peas, beets, cabbages and sugar cane, have been grown each year among the trees, with good results. Little manure has yet been applied, but can be used to great advantage.

A. O. Hammond.—My farm was first put in cultivation about 1845. Hay has been the principal crop taken off. The soil seems to be but little exhausted. I have used manure with the very best results. The effect of a few loads spread on a plowed field or meadow can be seen for several years. Have experimented both with the subsoil and trench plow; cannot discover any good resulting from subsoiling, but consider trench-plowing of great benefit. It can be accomplished to the depth of 12 inches, with two strong teams and common plows, one following directly after the other in the bottom of the furrow. It is hard work for both men and teams, and requires considerable patience. I find that the first crop is not usually as good as upon land prepared the ordinary way, but the second and third years the crops are greatly superior.

H. Sodowsky.—My farm was entered abont 1822. I came here in 1840. The crops raised have been corn, wheat, oats, rye, potatoes, buckwheat, etc. When one field needs rest we sow it down in timothy and clover, and turn up some other pasture. We haul all the manure and rubbish from about the barns and cow houses onto the fields, and by so doing, not only keep up our lands, but improve them. My experience is in favor of deep plowing. It enlivens the soil, leaves it in a healthy condition, causing it to retain moisture in a dry season, and in a wet season letting the water below the surface.

W. M. Allen.—The first 40 in 1836. I bought in 1839. The balance by parcels until 1856. Crops have been corn, wheat, oats and Hungarian. Exhaustion not perceivable. Have used manure for corn and grass with good results. Best plow, Munn & Ellsworth's, Bloomington. Deep plowing indispensable.

S. P. Boardman.—My farm has been put in cultivation, in different amounts, in different years, from 1858 up to the last year. Corn has been the principal crop taken off, although some land has been put in wheat, oats, Hungarian, flax and potatoes, from year to year. The greater part of the 150-acre field was broke in June, sowed to wheat in September, and the following year, after harvest, the stubble turned under and sown to timothy by itself, with clover added the following spring. The object in view in stocking new ground thus soon, being to get into tame pasture as soon as possible. This stocking does as well, apparently, as if the land had been cropped a few *years previous to seeding* with tame grass. Of the 640 acres

tame grass, but little of it has had over four grain crops taken off previous to seeding. In so short a period of cultivation no exhaustion of the soil can be perceived; the only difference in the cultivation being that the fourth crop requires more attention and labor on account of weeds. On one field, at present in grass, I applied a hundred or more loads of stable manure, when it had been cropped but two years, and could discern but little difference in the corn on the manured or the unmanured portion. I don't wish to be understood as saying that our land is so rich as to need no manure, but that, *for corn*, ordinary quantities of manure scattered on our new prairie soils, will make not much perceptible difference. When manure is applied to grass lands—no matter how new the ground—and put on in the fall, or right after mowing, its good effects are as perceptible in the increased amount of hay the next year as in any country I ever saw.

About the only sample of deep plowing seen in Illinois is when a tame-grass sod is trench-plowed. Although it is more than double the labor of common plowing, yet it more than pays in the increase of the corn crop and the labor of tending it. For trench plowing, I prefer two teams rigged to separate plows, rather than the same teams attached to any trench plow which I have yet seen. I have seen two or three different makes of the Michigan double plow, but none with which I thought four horses could do the work as easily as when attached to two separate plows.

Allow me, right here, to express the opinion, that by *stock-farming* Central Illinois (further I know not) will grow richer and richer. By stock-farming I mean that the principal returns from a farm shall be the income derived from some sort of live stock. I mean, too, that all the manure which shall ever be applied to such farm, shall be the manure dropped on its pastures by the stock, and the collections about the stables and sheds. I have seen examples of the sort in the case of "sheep farms," in the last sixteen years, and I *know* that such are richer than the day the plow was first "stuck in them." Now, I have not altogether a western man's undoubting faith in western soils, but I read everything I can get hold of in regard to keeping up the fertility of the soil. In looking over my eastern—extreme eastern—agricultural papers, I find that almost the entire amount of their space is taken up with talking about manures, and much of it about *made*, *commercial* manures. I can't conceive of any circumstances whereby Illinois prairie soils—if properly managed—will ever require anything but grass seed (particularly clover seed) and the accumulations of our stables, barns and sheds. I keep constantly in mind, too, the fact, that the early (or even later) settlers of more eastern States might once have talked of their localities as I do of Illinois, but I bear in mind that *they* had not, as we have, the experience of some older country to show that no soil, however rich, is inexhaustible. What I say is this: The soil of Central Illinois—cropped by any stock sufficient to employ three-fourths or more of its acres in tame grass, (to be mowed or pastured) and the balance to not remain in cultivation over five years before being "laid down" to grass again—will never "wear-out" as long as the world stands.

Take testimony of the oldest and best farmers in Central Illinois, and unless I am much mistaken they will all say "that there is no wear out to a stock farm in Central Illinois."

I don't wish to foolishly cry down the value of manures, or indorse the too common western notion that it is of no use to put manures on our lands. What I intend to say more strongly than anything else is, that western farmers—using the common *sense and experience* of three or four generations of more eastern farmers—need

not let their soils deteriorate the least bit, and, at the same time, it need cost them but little to "keep their lands up."

The State of Illinois will be a *stock State* for about ten years yet, after which time the sceptre will most probably depart from Judah When the time comes that it pays better to sell the products of our soil in the raw state of so much grain, I think we will need the teachings of two or three Agricultural Colleges to keep up the fertility of our soil. So long, however, as it pays us to keep stock enough to eat up our grain and hay, so long we will need only common sense to enable us not to wear our farms out.

In the future (when it pays Illinois to sell grain) we shall then learn (like England, where land rents for as much as the cost in fee simple of the most of our western lands) that we *must* keep a certain amount of stock, "wille, nille."

G. Harding—My farm has been in cultivation 15 years, or part of it; and that portion of it sown to grass has not diminished but materially improved in productiveness, while that portion planted with different grains has shown material exhaustion. I renew the soil by sowing it down to different kinds of grasses for pasturing. I have used manures to great advantage and practice deep plowing under all circumstances. Plowing in the fall is always the best for all kinds of crops to be grown the next season. The two-horse plow I consider the best in all cases for breaking up ground to be tilled. In trench plowing I use two independent teams and plows.

G. W. Vaughan.—Part of my farm was put in cultivation in 1848, part in 1855, part in 1860, 1861, 1864 and 1865. On the old part of the farm, corn, oats, wheat and grass have been taken off; from the newer lands corn has been taken. I can hardly say to what extent the soil is exhausted, since too much ground is undertaken by one hand, and consequently becomes poisoned by weeds, thereby lessening its vitality. I think if the ground were well tilled it would show no evidence of exhaustion for several years. I have never used stable or barn manure on my corn lands, but have applied it to meadows. I have practiced deep plowing but not subsoiling, though I am of opinion that it is very useful; I think ground should be subsoiled but once in 4 or 5 years. Had we a good shipping point near here, I would prefer deep plowing and tending in corn, then changing to small grains clover and timothy to recuperate the soil, which can be kept lively in this way quite as well as by sub-soiling. We find difficulty here in making meadows profitable, therefore the need of sub-soiling. I always plow deep for corn and have plowed both deep and shallow for small grains. I find, in deep plowing for corn and small grains, that the early growth of the plant is slower than in shallow plowing, but when once well set and fairly growing, its growth is faster. I know not why this is, but suppose that when the roots start to shoot downward they reach the hard surface in shallow plowing and get their set, and the top grows fast, sooner than if the roots were still growing downward in loose soil. From my experience in raising grain, I think deep plowing best for corn and early sown fall wheat, and shallow plowing for oats and late sown fall wheat. My reasons are these: corn planted in deep plowed soil grows slowly for a while, but the crop is generally double that of the shallow plowed soil. Wheat, when sown early in the fall, has time to get rooted and is harder to winter-kill when plowed deep, but if sown late does not seem to spread on the ground sufficiently. Oats generally grow too tall and rank anyway, and if the ground is plowed deep, they grow slowly *for a while*, then fast, and become so rank and late

that they fall down and spoil, when by shallow plowing they grow much faster at the start, then are checked in their growth, thereby hastening their maturity. I have seen splendid crops of oats raised without plowing at all, just barrowed in, in the spring, on corn ground of the previous year. They ripened quicker than those sown on plowed land. Oats do not seem to need much root to make the stalk and head. For spring wheat, I think it immaterial whether the ground be plowed deep or shallow, as it should in all cases be plowed late in the previous fall, and the wheat harrowed in as early in the spring as is admissible. I have never been successful with spring wheat when breaking the ground in the spring. Much difference of opinion exists about deep plowing. Some contend that deep plowing once in three years and shallow plowing for two is better than deep plowing all the time, as that turns up the new soil every third year, and it is but little exhausted in the intervening time. I, however, prefer deep plowing all the time, and if the ground seems exhausted, to recuperate it with some kind of manure. Deep plowing exhausts the soil in the same proportion that shallow plowing does, I think. The effect of deep plowing is on the crop produced. We have tried but few kinds of breaking plows; I have used the Peoria and Rock river plows for breaking up ground and find them excellent. I do not know that the gang and subsoil plows have been used in the county. In common with my neighbors I prefer the improved Rock river, made at Grand Detour, Ill., to any I have tried.

S. Butler.—Farm put in cultivation six years ago. The crops have been corn, wheat and buckwheat, broom corn and Hungarian corn. The crops in the consecutive years have been equally good. Manure helps the soil fully one-third.

W. F. Bliss.—Smith's cast steel plows, C pattern, answer a good purpose in breaking prairie.

D. Gove.—I improved my farm myself, commencing seven years ago; my crops have been wheat, corn, oats and the grasses. I cannot percieve that the soil is exhausted in the least, in fact the wet spots seem to get better as they are drained and opened up to the sun and air; and on the thinner portions of the farm, I have spread all the manure that accumulates annually, mostly on the meadows, during the fall and winter, and the effect is very great and more than pays for hauling out the manure the first crop. I have always been in favor of deep plowing, and my experience every year more fully confirms me of both its immediate and lasting results. Deep plowing is the best for either wet or dry seasons. And the land after once being deeply and thoroughly plowed is ever after less liable to run together or to become baked, as is the case where shallow plowing is practised. My own practice is this: put three heavy horses abreast to a plow that turns about 13 or 14 inches, which I have had made to order, of a shape that will run deep and at the same time have a curve that will pulverize the soil as much as possible; and for corn the depth of furrow is governed by the strength and endurance of the team, but usually from 10 to 12 inches; then thoroughly harrow, and, if dry, roll and then plant, and, in addition to all other good results from deep plowing, the seeds of noxious weeds are buried so deeply that if they come up at all, it will not be until after the corn is ready to cultivate.

J. G. Swann.—In 1835. Crops have been corn, wheat, clover and broom corn. Soil very little exhausted. Have used manures with good results. Deep plowing always. Moline plows; for cultivation, double shovels.

E. A. Riehl.—Some in cultivation perhaps 20 or more years, some more recently. Crops, corn and wheat. The old land seemed to be exhausted when I came in possession, 4 years ago, but deep plowing and turning under a crop of clover has made it as good as any new on the place; have used all the manure made on the premises with the usual satisfactory results. Deep plowing insures good crops. There are many good plows, and can not designate all; the Mellen plow, made at Alton, is as good as any and made of good material, the Peoria and Moline are also good, the Mapes is the best subsoil I have tried. Prefer a double triangular harrow with 48 teeth, and, better than all harrows and rollers, the Cumberland clod crusher, cut and description in No. 7, Vol. 2, *Farmers' Advertiser*.

J. Balsiger.—Part of my farm has been put in cultivation, I believe, about 40 years ago, long before I came in this country; the rest I cleared myself or had it cleared, and broken from 7 to 10 years since. Before the land was mine, it was nearly all and every year planted in corn, no meadow; in consequence of this, in some rather steep places the good soil has been washed off by the rains, and these places need manure to produce crops. Where this was not the case the soil has not considerably lost of its former richness, especially the land which has been put in cultivation more recently. Deep plowing has a very good effect on the crops where the subsoil is not too near the surface or not of poor quality.

J. Y. Bothwell.—Kind of crops raised, wheat, corn, oats and grass. Improvements made from 1851 to 1856. The soil seems but slightly exhausted, producing almost as much as at first. Have used manures with the best results. I use a double sod plow for breaking up, made by John Gill, of Columbus, Ohio; work three large mules; plow ten inches deep, follow it with subsoil plow, the Rooster, made by G. C. Miller, Cincinnati, Ohio; use two mules to run it from 5 to 6 inches deep in the same furrow, with the best result to land and crops. In 1866 my wheat averaged 27 bushels to the acre, and sold for $2 per bushel; I could have had $3 by waiting till spring. This township did not average 5 bushels per acre that year. Last year the result was nearly as good, and my growing crop looks fine, notwithstanding last fall was so very dry. 1866 was when I commenced deep ploughing. The longer land has been in cultivation the deeper it should be plowed.

T. Engelmann.—The first ground on my farm was broken in 1850, and the work o breaking up continued in the next following years; the land on the slopes of the elevation, being rich and dry, has since that time been in wheat from year to year; and the land in the flat prairie, being low and wet, has as regularly been in corn every year; manure has never been used, the soil showing no signs of exhaustion. Deep plowing has not been tried; the plows used for breaking ground are made by the blacksmiths of the neighborhood; plows manufactured at other places and brought here for sale are generally discarded, not because they are considered inferior, but because our blacksmiths can not or do not like to do the necessary sharpening and repairing properly.

G. C. Eisenmeyer.—Deep tillage is always beneficial, hence the old adage, "Plow deep while sluggards sleep, and you shall have corn to sell and to keep." However, ground prepared for wheat should not be plowed deeper than the previous year. Wheat is of so fine a nature that when the *unairyfied* soil, in other words, soil that has never been exposed to the beneficial effects of air, rain, sun and dew, proves very injurious to the kernel or grain of the wheat, you will obtain plenty of straw but poor wheat. The common *steel mould board* plow, and the so-called gang plows,

made by Jacob Hage, of Shiloh, Ill., and another by parties in Monroe and Washington counties, are in general use here.

J. Barber.—I have 100 acres, 60 of which are in fruit, the remainder in pasture, meadow, etc. A small part of the farm has been in cultivation since 1850, mostly corn and oats for the first few years, and subsequently put in orchards. Has been exhausted but little. Have used all the manures made on the farm, with a considerable increase in the amount of products.

Find deep plowing not only beneficial to crops in seasonable years, but a great preventive of the evil effects of drouth; also find fall plowing better than spring. The best plows are made of steel. I use those made by John Deere, of Moline, Illinois.

5. GRASSES, CLOVERS, ETC.—What do you find most suitable varieties for pastures and meadows: mode of seeding and quantity sown per acre: largest and average yields of meadow lands: average number of live stock of different sorts pastured per acre: experience in top-dressing meadows, and its effects: stage of growth at which grasses, etc., are best cut for hay: implements preferred for hay-making?

E. Moss.—Clover and timothy; sow principally with wheat or rye, and in spring about 12 quarts of mixture per acre. Yield 1½ to 2½ tons. Top-dressing meadows is good.

G. Chaffee.—Clover and timothy. In seeding to grass have no established rule, but use not less than eight quarts of clover and four to eight of timothy per acre. In a few cases, have sown timothy in September upon oat stubble and harrowed it, then sowed the clover early in spring, and with success. More frequently I sow grass seed after oats, and give it a light harrowing and roll. Clover is a great renovater of the soil. Would mow one to three seasons, then plow. Cultivate not to exceed three crops without seeding, unless manured.

M. A. McConnell.—Clover, timothy and red top are the best varieties for pasture. My pasture, that has been used for 30 years, is the best I have, and affords the richest feed. Cattle want large range and plenty of water and shade trees. The under-brush is all taken out of my pasture.

Top-dressing is very fine for meadows but not for pasture. We always prefer to mow our grass just after the bloom falls. We use Manny and Kirby combined machines, and McCormick's mower. We have three machines, and they all work well. For getting up the hay we have Hollowworth's sulky horse rake—the best in all the land.

A. Baley.—Sow two parts timothy to one part clover, one peck to the acre.

H. Pierce.—Timothy for meadows; for pasture have plenty of prairie as yet. Three tons is the largest yield per acre—usually from 2 to 1½ and 1. Timothy is best when the bloom is just about to fall off. Manny's reaper and mower is the principal cutting machine, although all have their representatives in the hands of different farmers. Revolving wooden horse rake is the leading article, yet others are used.

J. Tefft.—Clover, timothy and red-top. Not much experience in feeding, as farm is rented on shares.

S. Reynolds.—I like timothy and red-top best for pasture, and also for hay; but usually sow clover and timothy together. The more clover the better for the land, and the less the better hay and pasture, except for hogs, and they do best on clover. I like my hay cut with a Buckeye; rake with the Ohio revolver. Have used the horse fork some, but prefer the Batchelder pitchfork.

J. Schoenleber.—Timothy and red clover for pasture; for seed I prefer either alone; prefer seeding wheat or oats on wet ground. Have the ground plowed in the fall, and sow as early in the spring as the ground will admit. Sow the seed after the wheat is harrowed, then roll; or if a heavy rain falls it will answer the purpose of rolling.

Have raised timothy mostly for seed—half peck of seed to the acre; for pasture or hay I would prefer one peck of timothy and two quarts red clover. Largest yield six bushels of timothy seed to the acre; lowest yield three bushels. By top-dressing one can always calculate on six bushels. At $3 per bushel this pays better than wheat, as the straw and pasture will pay for harvesting and threshing. One seeding will do for 20 years or more.

C. E. Barney.—For pasture, as many kinds of grass as will grow on one piece of land at once. For hay, red-top cut early. Timothy, cut just after the blossoms fall. For mowing, a compact machine without a reel; should not cut more than 5 or 4½ feet, and have two driving wheels

A steel wire adjustable tooth sulky rake I find very convenient, and a horse fork with short handle.

V. Aldrich.—For early pasture, blue grass or June grass is best, as it starts much earlier and will bear tramping early, when the ground is soft, with less injury than other kind. Clover and timothy, with a mixture of red-top, is preferable after it gets a good start—say six to eight inches high. It never should be fed off close, but given rest and a chance to keep in good bite for the stock. Timothy mixed with one-eighth clover I prefer to anything else for meadow.

The best success I ever had resulted from sowing my grass seed right on the stubble ground from which had been taken crops of oats or wheat. I sow the grass seed the last of August or first of September. The first rains will bring it right up, and if the fall is wet and warm it will get a good start. The stubble keeps the cold winds from it and holds the snow, which protects it through the winter. The next summer we may expect a good crop of hay. I sow one-half bushel timothy seed with two to four quarts of clover, well mixed before sowing, so that one scattering completes the work.

Average yield of hay per acre, 2 to 3 tons; two tons without manure would be full average. I have a five acre meadow that has had nine crops of hay taken from it in nine consecutive years, and never yielded less than two tons, and several years three, when it was wet and favorable to the growth of hay. This meadow has been manured twice in the time, completely covering it. Each time the manure was applied in the fall—October or November. I prefer to cut my hay when it is in full blossom, or just as the blossom is ready to fall from the timothy. At this stage the stalk contains all the sap and the blades are all green. If not cut now the sap goes into the seed, the stalk becomes hard and woody at the bottom, and the leaves begin to turn yellow and die. The longer it remains the more worthless it becomes as fodder.

I have used a two-horse mower—Ball's patent. It cuts close and easy. The Buckeye is about as good. No combined mower and reaper will cut anything but timothy, when standing well, close enough. A single mower will cut lodged grass as well as it can be done by hand with a scythe. A one-horse revolving rake does the work well and expeditiously.

I never practice mowing more in the forenoon than we can rake and put into the cocks the same evening. The *next day the cocks* are opened and the hay cured [illegible]

ciently and carted into the barn, without being wet or bleached by the dew. When my barn is full I stack hay under a shed roof. This is nearly equal to a barn. Make a double roof—span twenty-four feet—and as long as needed; cover with sixteen feet boards, and batten with fence board. If the boards are sound this will make a tight roof.

Timothy and clover are the only grasses sowed here for pasture; but the natural pastures, after blue grass and white clover get in, are much the best.

Sow eight quarts of timothy and four of clover, per acre, in the spring, either with wheat or oats, or in the fall by itself, minus the clover, which is sowed the next spring. Average yield, two tons per acre; greatest yield, three tons per acre. I pasture one horse or cow per acre, and from five to ten hogs per acre. I think we can double the yield of our meadows for hay and pastures by manure. The best time to cut hay is just after the blossom drops. The Buckeye mower and the sulky rake are considered best here.

G. W. Minier.—For meadows, timothy, or clover mixed with it; and same for hay. Sow moist ground, red-top is preferable. Generally seed with wheat, oats or barley; have seeded after burning off stubble in the fall. I wish to speak this in an undertone, for whoever burns his stubble is, in so far, a spendthrift. We usually get about two tons of hay to the acre. We can keep one ox or cow to the acre, or about five sheep. The best top-dressing for meadows is the folding of sheep, the penning of swine, or herding and feeding cattle. Stable manure should *not* pass through fermentation before being spread on meadow, or elsewhere. But this contradicts custom, and therefore will provoke controversy, and most men will still carry a stone in one end of the bag, and a peck of corn in the other.

The *time* to cut grass for hay is after the bloom has fallen, or rather as it falls. Mower—Buckeye, or any other as good; horse-rake; good hand pitch-forks. A large amount of hay will warrant other implements.

J. Robinson.—For summer pasture I prefer timothy and clover; for early spring, fall and winter, Kentucky blue grass. I have made very good pastures by sowing one and a quarter bushels of rye per acre, early in September, among the standing corn, covering with a one-horse double shovel plow, by passing on each side of the rows as near the standing corn as possible; then before a rain falls on the ground thus passed over, sow timothy seed at the rate of one bushel to six acres; the seed will be covered by the first rain; the rye and corn stalks afford good protection to the young grass during the fall and winter. On the ground thus treated I sow clover late in the winter, being governed as to the amount of clover seed to be sown by the condition and stand of timothy and the amount of clover I want on such pasture—one bushel on twelve or fifteen acres being a very good mixture. Land thus sown is sure to catch well the first year, and produce as much feed the first summer as a good, well set clover and timothy pasture. It is best not to pasture when very wet. Land seeded in this manner is too uneven and the stalks interfere too much for mowing.

For meadows I succeed best seeding a mixture of one-fourth clover and three-fourths timothy; sow early in the spring on land well plowed, and with wheat or barley, well harrowed; and if the ground is rough, roll before sowing the grass seed, cover the seed with a light harrow or brush; one bushel on six acres being a fair quantity. It is very desirable to set a meadow with the ground as loose as possible, as a hard bottom never yields a heavy crop of hay. My average crop is generally about two tons per acre.

Two acres is usually required to pasture a grown horse or cow the entire summer; a less area will do until the dry and warm weather after harvest, when I add meadows to my pasture when very close, lest my succeeding crop of hay be diminished, and my land fails to be renovated as it should be. The grass should be cut for hay as soon as the timothy seed is in the dough, and cured as well as the weather will admit.

If my hay is well cured when I put it in mow or stack, I sprinkle ten pounds of salt to the ton; if a little green, fifteen; and if very green, twenty pounds. A good mowing machine, hay rake, and stacking machine, or, if in a barn, a horse fork and some light steel spring, but strong, pitchforks, are all the machinery required for hay harvest.

J. R. Tull.—Red clover is best for improving the land, and is valuable as hog pasture, as well as food for cattle. It is the best crop known in this country when used as a fertilizer; which is done by plowing the seed crop under when the seed is sufficiently ripe to seed the ground. Land that is very much exhausted may in a few years be restored to its original fertility without any other fertilizer.

I consider timothy our main grass for the hay crop. Our yield is from one to one and a half tons per acre; very rarely we get two tons. I find a top-dressing of good stable manure greatly increases the yield per acre.

My experience in cutting timothy for hay has taguht me not to cut it until the seed is ripe enough to grow. Some say, cut it when in blossom; but if cut at that time there is a heavy loss in weight and substance.

For cutting timothy, I find Ball's large combined reaper and mower to do excellent work.

T. Gregg.—In meadow I have no experience; but can report that timothy, and clover and timothy mixed, are mostly grown for meadows on the prairie farms hereabouts. In mode of culture and amount of production I am not well enough posted to report.

A. C. Hammond.—Timothy produces the best results as a forage grass In seeding I use from one fourth to one-fifth of a bushel per acre. Usually sow on wheat in the fall or winter. I find that top-dressing with stable manure will increase the yield from twenty-five to fifty per cent.

H. Sodowsky.—For meadow grasses I prefer red clover and timothy—one-eighth of clover and seven-eighths timothy. For pasture I would add a portion of blue grass. My mode of seeding varies; I have sowed timothy the last of August and it did well, and I have sowed it in March and April and it did well also. Clover seed should be sown about the last snow in March. I usually sow broad-cast, and about one bushel of timothy and one-eighth of clover to 6 or 7 acres. Meadows differ so much in wet and dry seasons that it is difficult to estimate the average yield, but I would place it at 1½ tons per acre, in a favorable season, and one ton per acre in a dry season. In this section of the country we calculate 2½ acres to the head for grown cattle. We think that a three-year old steer requires the same amount of grass that it takes to pasture six sheep.

My experience in top-dressing is limited. I find it advantageous to roll meadows in the spring, when the land is thawed about two inches deep. This process levels the land, and presses back the grass roots that have been drawn out of the ground by freezing. The time of cutting hay varies with the amount to be cut. If I have a a long harvest, I commence as soon as the seed is in the dough. I find that hay

cured at this stage is better for stock than at any other, being small, soft and full of nourishment. When riper it is hard and stiff, with more wood in the stalk. Stock cannot cut so much of it, and it does not do them the same amount of good.

W. M. Allen.—Timothy and clover. Have tried all modes of seeding; each sometime fails Quantity, 8 quarts timothy, 4 quarts clover; yield, 2 tons to the acre. The best time to cut timothy is when the bloom is off.

S. P. Boardman.—Either for meadow or pasture, I find it best to sow quite a variety of grasses. Our prairie soil is so light, loamy and *grainy*, that it heaves grass roots out of the ground terribly in the spring of the year. To obviate this heaving process there is nothing like having *the ground well covered* and the soil well *tied together with grass roots.* Any one who has ever had any experience in sowing grass knows that timothy can be made to cover the ground only about so close, no matter how much seed may have been sowed to the acre. Another fact with regard to sowing timothy is, that, no matter what the "stand" which may have been obtained from an original sowing, no subsequent sowing seems to help the matter a bit. Timothy will "take the ground" to a certain extent—no more, no less—leaving space which can be occupied by other grasses. In a less degree the rule holds good with all other of the most common grasses sown, except blue grass and red top, which spread from the root.

I have been sowing grass for the last sixteen years in Illinois, and I am satisfied that the worst mistake men make in general, is in not putting on seed enough. I am now sowing about 160 acres to grass, and I am putting on 11 quarts to the acre—being a mixture of timothy, clover, orchard grass, and red-top—a peck of the first, a quart of the second, and the two last by the "grab."

My largest yield of hay (*season* makes everything with the hay crop) has been two tons to the acre. In a general way we get a little over a ton, perhaps, as an average crop.

My farm is stocked almost wholly with sheep, and I am trying to stock light; five sheep to the acre is as many as I wish on my pastures. "Big grass under stock makes a profit; short grass, short everything."

The best time to top-dress meadows is immediately after the hay crop is taken off, and will make a difference of an increase in the hay crop of from one-fourth to one-half. No way so good, that ever I have found, to apply manure in Illinois.

G. Harding.—For pasturing I sow a mixture of grass seeds—timothy, red clover, English blue grass, native blue grass; white clover comes up itself. This mixture makes the best pasturing that can be made in any soil; the native or Kentucky blue grass, with some timothy, being the best for fall and winter pasture. Sow a peck of the blue grass seed, with a little timothy mixed with it, to the acre.

For summer pasture the English blue grass will yield twice the amount of any other. Sow one-half bushel seed, with a little timothy to the acre.

This mixture of seeds does well on most all kinds of land, sown in January or February, and should not be pastured the first season. Timothy, with some red clover mixed, is best for meadows that you intend mowing for hay, sowing about one-sixth of a bushel per acre. Sow from the first to the tenth of September. Average yield per acre is two tons.

Two acres of mixed pasture will take a three-year old steer through the grazing season, and make him gain 300 to 400 pounds in an ordinary season.

Timothy makes the best hay when cut just after the bloom drops.

The Excelsior or Buckeye mower, common revolving horse rake, and Fowler's hay derrick, are among the best hay-making implements.

G. W. Vaughan.—For meadows I prefer timothy and clover mixed. For pastures, I want different kinds. Blue grass is the best for early; then red-top, timothy and clover. Blue grass is hardly fit for summer pasture, as it dries up and has but little substance, while red-top, timothy and clover keep greener and have more substance. Timothy and clover meadows make splendid fall pasture, and blue grass early winter, and if not pastured too much in the spring will keep green nearly all winter, and sheep will need little if any other feed except while snow is on the ground. Timothy and clover pastures do not last like blue grass and red top; the timothy is easier killed by close pasturing, and the clover, if not allowed to seed, will die in two years, as the plant lives but that length of time from the seed. Clover is splendid for pasturing hogs during the spring and summer. I think red-top fully equal to any kind of grass for pastures. English blue grass not so good as the common kind.

My plan for sowing grass seed is, to put the ground in wheat in the fall, and then sow the seed in February or March, on snow if possible. Clover seed, however, should be sown later, as the young plant is more easily killed by freezing than that of other kinds. I usually sow one peck of timothy and one-half gallon clover seed, per acre. If sown together, less of either is required. When wanting a red-top or blue grass pasture, I mix the seed with timothy and sow together. The timothy makes a good pasture until the other gets sufficient hold, and is then rooted out by either blue grass or red-top. Red-top yields less per acre than any kind we have, as it is very light. Timothy alone seldom yields more than two tons per acre, while timothy and clover often yields from three to four tons. The average yield is about two tons per acre. Clover is very essential to meadows for producing a good yield of hay.

I have tried top-dressing meadows enough to satisfy myself that nothing pays the farmer so well as that mode of recuperating meadows. Manure for that purpose should be well rotted, if possible, but if not, will answer well if put on in the fall, so that the freezing, thawing, and rains of winter and spring will dissolve it, thereby washing the strength into and around the roots of the grass. Manure should in all cases be put on the meadows in the fall or early winter, if one expects to secure the benefit of its full strength. I hauled out a lot of manure last winter and put on my meadow. I did the same in the spring, and the difference in result was very perceptible. The winter dressed meadow was a great deal better than the spring dressed, and that better than the meadow where no manure was applied. One load of manure, put on the meadow in the fall, will pay a large percentage to the farmer.

I prefer cutting grass when the seed is just ripe or in the dough. I never want it cut too green or too ripe, as it moulds when too green, and the seed falls off when over ripe, making it disagreeable to handle. Stock will eat hay cut when the seed is nearly all off better than when cut green. I have seen this tried.

My father cut a piece of meadow just after the bloom fell off, and then cut some after the seeds were nearly all fallen, this last being left to seed the ground; both were put up without any rain; the former was as nice bright hay as I ever saw, while the latter was brittle and seemed of little account. We stacked them and fed them together, and the stock would hardly touch the bright hay when they could get the

other. I have since repeated the experiment several times and with the same result. Clover should be cut when the bloom begins to change color or begins to die.

The machines preferred here for cutting grass are the Excelsior and Buckeye. There is little difference between them. They do splendid work and are easy on the team. We generally use rakes made by a man in our own neighborhood, named Hampton. They are not patented and are, consequently, not known in agricultural works. They do splendid work; they have but one handle and are much more easily used than the patent revolving rakes formerly in use here. These revolve like the others, but there is a different mode of stopping the revolution. So little hay has been made in this part of the county, that the derrick has not been used. Our hay is stacked with "Armstrong's Machines." I prefer the derrick to stacking by hand, and think it will be used here next summer, as meadows are more extensive now than formerly.

S. Butler.—Timothy is used mostly for hay and pasture. From thirty to forty head of stock may be pastured on 40 acres.

D. Gove.—For pasturage, I think a mixture of timothy, red clover and blue grass the best; for hay alone, timothy and red clover are the best. I have had good luck in sowing grass seed on fall wheat about the first of March, in the proportion of about one-eighth clover mixed well together, and sow about one bushel of the mixed seed on five or six acres of ground. An average yield of hay per acre is about three thousand pounds, in an average season. I think three acres of our grass will keep a horse or cow in good condition, and an acre of good red clover with twenty ears of corn per day, will keep ten head of ordinary sized hogs through the pasturing season. My experience is that top-dressing of meadows with barn yard manure in the fall or winter is the best disposition we can make of the manure. I think the best time to cut hay is when, if it be timothy and clover mixed, about half the clover heads are ripe; and for the good of the meadows afterwards, I do not cut so near the ground as some, in as much as I think that portion of the growth near the ground worth more to the meadow as a mulching than it would be in the mow for feed. As regards implements for making hay, I am a little partial to the Buckeye mower, the revolving rake for gathering and the horse fork for elevating into the mow.

J. G. Swann.—Clover. McSherry's drill. One gallon per acre. Two tons. When blossom is fading. McCormick's mower.

J. Balsiger.—Clover does very well with me, particularly on upland. I can cut mine three times in one season. For pasture, blue grass is to be preferred as more lasting and hardy; it grows here spontaneously. For meadow, I prefer timothy and red-top; the latter brings very rich crops on bottom land which is sometimes overflowed. Red top hay is, as far as I can judge, of very good quality; cattle and horses like it, but it is lighter than timothy. I sow one gallon clover, and about three gallons timothy seed, per acre. I never sow any red-top; it comes up by itself on meadows or bottom land, and crowds out the timothy growth. Top-dressing meadows has a very good effect and stimulates the growth of the grass; out I prefer plowing in the manure before seeding with grass. I believe its effect is more lasting. I feed my hay out mostly on the farm, and therefore do not weigh it, so that I cannot tell how large the yield is per acre. I think two tons are a good average crop. For cutting the hay I use a Manny's mower, and rake it up the same day with a common revolving horse rake, if the weather be fine so that it dries quick; afterwards it is put in shocks or cocks and stacked as soon as possible. The best

time for cutting clover is when it is well in blossom; for timothy and red-top, soon after blossoming is over, when the seed commences forming.

J. Y. Bothwell.—Grasses: I prefer timothy and red-top mixed. Sow in February or March on growing wheat; one bushel on five acres; about two tons per acre is an average crop. Top-dressing will pay well. Cut grass when the earliest heads are brown. I use the Buckeye mower, and a wooden horse rake; this rake gathers no dirt with the hay as a steel-toothed rake does.

T. Engelmann.—Grasses and clover are not much grown, although they succeed well in our soil; and live stock is raised and kept only for family use, and not for market.

G. C. Eisenmeyer.—Blue grass for pastures, and timothy for hay. The time of seeding is about the first of September, on ground well pulverized. Summer fallow on wet ground is always preferable. I will sow on no other ground. The ground cannot be too well prepared. If the season proves unfavorable—if too dry after sowing and you do not obtain a good stand, sow again on or about the first of March following. The yield of timothy is from one to three and a half tons; one and one half tons is about the average crop. I always sow five acres of timothy with one bushel of seed; of clover, from 8 to 10 acres with one bushel. I sow with the thumb and next two fingers; always let the middle finger scatter the seed.

No kind of stock should be allowed to run on your meadow land after the frost is out of the ground in the spring; while in the fall, pasturing is of three-fold advantage: 1st, to your stock; 2d, to your meadow, by eating out the weeds and rank grass; and, 3d, the enriching of your meadow by the droppings of your stock. Top-dressing with barnyard manure should never be neglected; not an ounce of manure should be wasted, but all that can be obtained be put on your meadow.

Grass should be cut as soon as the seed is perfected and before fully ripe. Use any of the many valuable two-horse mowers. I always cut in the forenoon, and rake and cock up in 100 lb. cocks in the afternoon. Grass should never be exposed to the very injurious nightly dews, or too long a time to the hot and scorching rays of a July and August sun. Much hay is made burning it up by too long an exposure to the sun's rays, and the balance of the saccharine matter (the only nutrition in hay) is extracted by heavy injuries which make it more worthless than good oat straw.

Making of clover hay is of a more particular nature still than timothy, yet my experience is such that good clover hay can be made almost any season. We generally have rainy days about the time that clover ripens and is ready for the sickle, which is about the first of June.

I always cut clover when I am ready, regardless of the weather. I leave it on the ground without turning it till full three-fourths cured; rain won't hurt it much if it remains on its first swath. I always aim to house it up when I turn it; it had better rain on it a week on its first side than once after it is turned over. Clover is one of the great essentials in good farming; it makes the finest pasture; it drives worms from horses as well as hogs; fattens everything that will eat it; it will increase as well as improve the milk of cows; is more nutritious for farm horses than timothy; young stock will fatten on it, and work horses will need but little grain if they get plenty of good clover hay; last and not least of all it improves your land. I always sow about the first to the fifteenth of March, on wheat land. It hardly ever does well when sowed with oats. I always judge of a farmer's common, practical sense by the size of his clover fields, and find it a good criterion.

J. Barber.—For pastures, I use red-top, timothy and clover. Red-top is sown on the low ground. Sow timothy and clover together; about one-eighth as much clover as timothy. Close pasturing soon kills out the clover. If not pastured in the fall it will remain for many years.

J. Warder.—We use clover, timothy and red-top successfully.

6. GRAINS.—Best varieties of corn, wheat (fall or spring), oats, rye, barley, buckwheat, etc., that have been tried in your neighborhood: the best time and method of preparing ground for each of the small grains: time and method of planting or sowing: drills, sowing machines or planters that you have tried and found best: best harrows and rollers: cultivation of corn, with the kind of implements used: experience, if any, in cultivating wheat by horse-hoe or otherwise: time of cutting up corn: method and implements: time of cutting small grains: reaper or header employed: practice in shocking, stacking or putting small grains in barn: largest and average yield: insects and diseases and methods of subduing them?

E. Moss.—Corn, Yellow Dent; spring wheat. Fall plowing is considered almost a necessity. Stack grain; put hay in barns.

Geo. Chaffee.—As we almost invariably husk the corn on the hill, and allow the stock to feed upon the stalks during the winter, we have the land to plow in the spring, if plowed at all. When the land is dry and light in the spring, as it usually is after a dry fall, I put on the cultivator, use it thoroughly, then sow the seed, harrow and roll, and in some experiments, side by side with that which was plowed; that sowed without plowing took the preference. When the land is clammy I would by all means plow, then harrow lightly, before seeding, and thoroughly after, and roll. Sow not less than five bushels per acre, and for the last eight years have, on the average, harvested 60 bushels per acre.

In a few cases I have planted corn after corn for 4 years in succession, and a few acres highly manured, but usually plant after oats and clover and timothy sod, applying manure as much as possible to corn land, and, if sufficiently fine to mix with the soil, apply it upon the surface of fall plowed land; if coarse, turn it under with the oat stubble. I choose to have all my corn land plowed in the fall so as not to be obliged to meddle with it in the spring until it is dry. Then put on the cultivator and harrow, roll as necessity requires. Plant from the 25th of April to the 15th of May in rows 3½ feet apart. Formerly planted in check rows, but for the last 3 seasons have planted in drills. When the corn is about making its appearance above the surface of the ground, harrow it by driving the team astride each row and use the hinge harrow with teeth of cast steel ½ inch square (48 teeth). When planted in check rows, thin to three spears in a hill; when drilled allow a spear to every 10 or 12 inches.

1862.—Corn, fair growth; fall favorable; yield 40 bushels per acre. 1863: good growth of stalks, but hard frost August 30th; yield, 20 bushels per acre. 1864: good growth; chinch bugs attacked it in July, and white grubs in August; yield, 35 bushels per acre. 1865: heavy growth, and fine fall; yield, 75 bushels per acre. 1866: heavy growth; August and September very wet with frost about the 20th of September; yield, 25 bushels per acre. 1867: average growth; but that planted on tame grass sod injured by the white grub; yield, 40 bushels per acre.

M. A. McConnell.—The best variety of corn for this latitude is Yellow Dent. Spring wheat is the only crop, and the best kinds are Club and Scotch Fife. Fall plowing is best for all kinds of grains and best for the ground. The spring grains want to be put into the ground as soon as possible after the frost comes out and the ground settles. We use the broadcast sower and have a cultivator that follows

the sower. The best harrow is a 32 tooth drag, with the hinges running through the drag, and a cast roller is very much the best. All grain wants to be cut early.

H. Pierce.—Both White and Yellow Dent corn. Club wheat has the most admirers; common white oats; no rye; very little barley; don't sow buckwheat, it is so hard to kill out. Fall plowing, with heavy harrowing, is best for all crops. Sow as early as we can work the ground for wheat and barley. Plant corn from 15th of April to 15th of May. Cultivate corn with wheeled cultivator. Riding is preferred by some, but both are about equally used here. Lay by with common plow. Pull all corn here. Reaping machines alone are used. Shock of 10 bundles, capped by 2 more. Stacks are put up with from 150 to 300 bushels in each. Average yield of wheat, about 15 bushels per acre.

J. Tifft.—Corn is small Dent; plant as early in the spring as frost will admit; cultivate early with small plow by turning away from hill as close as can run plow without disturbing it, for the purpose of letting in sun to warm the land. Then, in a few days, turn furrow back and cultivate afterwards with cultivator. This, with buckwheat, which we raise in orchards, is all the grain usually raised on the farm.

S. Reynolds.—Ground for wheat is best plowed in the fall, not very deep; and sowed very early in the spring. I use Brown's drill, made in Ohio. Sow from one and a half to two bushels per acre; oats, three bushels. Like the A harrow or double A best. Have seen very good corn raised with the drag, double shovel plow; and the best way to shock grain is as follows: set ten sheaves on the ground, then lay one or two on top. Largest yield, 90 bushels; average 35, oats. Wheat, largest yield, 30 bushels; average 15.

J. Schoenleber.—The best variety of corn here is the flesh colored; it gives the most abundant yield. For five years I raised the Velvet Winter Wheat; two years since 13 acres produced 100 bushels of wheat and 200 bushels of chess. Last year I sowed 12 bushels and my crop was but 6 bushels; part of that ground I covered in the fall with prairie hay to keep it from freezing out in the spring, but it did no better than the rest. That was the last winter wheat seen in this township.

Of spring wheat, the soft Siberian has been used longest but is now run out. The Rio Grande, Canada Club, Scotch Fife, Bull, Tea and Rhode Island are used. The last two kinds are used most at present, but seem to run out like the Siberian.

Last spring I sent to Wisconsin for White Fife. I sowed 45 bushels on 30 acres, on an 80 acre lot, cornering on the north west of the above described farm. The yield was 410 bushels, about 30 bushels to the acre. The ground was broken with a Rod plow in July; in the Fall it was plowed again; in the Spring harrowed, then sowed, and then harrowed double, both ways.

Last Summer, I broke again 25 acres, plowed it again, and shall sow it in wheat and keep account.

In 1857, I had 31 bushels to the acre, on four acres, and on 16 acres the yield was 25 bushels to the acre, but since that the yield has never been over 18 bushels to the acre, and sometimes only 7 bushels, owing to injury from the chintz bug and wet, sultry weather about ripening time.

In the cultivation of corn, I have used the Brown Planter, the D—— Planter and Cultivator combined, and at present I use the Union Planter, which I like the best. The D—— Planter I used two seasons, and it was at least one thousand dollars damage to me, as I could not raise more than two-thirds of a crop. The Planter and Cultivator is a nuisance; as *for a cultivator, if* labor was only cheaper. [illegible]

prefer the one-horse double shovel plow. I use a two-horse cultivator that one can either walk or ride on. Corn should be cultivated when small.

C. E. Barney.—Yellow corn will feed more than white, will make more alcohol, will not be so much discolored if slightly damaged.

The best seed wheat is that brought from a distance, from different soil and more northern climate

The best varieties of oats are those that stand up the best; as far as I have observed, the barley oats do that.

I believe in doing most of the work on a corn crop, just before and after planting; plow well, then roll, and your corn will be an even depth; then harrow before the corn comes up, then roll again, then harrow each side the row, then roll again; continue to roll, after harrowing or plowing, as long as the corn will bear it without breaking, which may be done till the corn is about 10 inches high.

Fall plowing, sharp harrows and heavy rollers for any crop.

In harvesting, use the header if you only want grain; if you want the straw, also, use a reaper; after the straw dries, pitch on wagons with barley forks, unload with horse fork. *Never* bind or shock wheat, oats or barley; it costs more, wastes more, requires more labor to make and stack bundles.

V. Aldrich.—I have had but little experience in the cultivation of any grain, except corn. I have found the best time for harvesting corn to be when the best or ripest ears begin to turn their husks; at this stage the blades are green; the corn is all hard and glazed, and it cures quick and makes excellent fodder. Implements for cutting are corn cutters, generally with straight blade; clasp a hill with the left hand and cut it with the other. To shock round, I use a scantling or 3 inch pole, with two legs in one end, long enough to raise it about 3 feet from the ground; back mid way from the legs to the back end, about 12 feet, that lays on the ground, I bore a 1½ in. hole, and put in a stick, 5 feet long or more; this stick is horizontal, Setting the corn in the four corners until there is enough for the shock, I then have another stick, with crank at one end, and pin about one foot from the crank; fasten the rope to the pin, stick the long end through the shock, and carry the rope round the shock, and make fast again to the pin; turn the crank until the rope has drawn the shock as close and tight as you want it; put round your band and then loosen the rope and take it away; pull out the stick from the scantling; take hold of the end the legs are in, and pull it out of the shock; then go ahead with it for the next shock.

A. Rankin.—The large White and Yellow Dent corn are the best varieties. The best oats are the Surprise.

The best time to sow wheat and oats is as early in the Spring as the ground will admit; fall wheat is uncertain. Rye does well; sow any time in September. Average yield of corn in the country is, I think, about 85 bushels per acre. One of my neighbors and myself raised over 87 bushels per acre. I did not have a very good stand or should have raised more. Average of wheat, per acre, 10 bushels; average of oats, common oats 35 bushels, the Surprise oats 125 bushels.

Fall plowing is considered by many as the best to sow wheat or oats on, but I have found it just as well to sow on stalk ground, by putting it in with the cultivator, harrow and rolling smooth, without plowing, where the corn was thoroughly cultivated, the year before.

The best harrow is the hinge harrow, made nearly square and joined together in *the middle by long,* strap hinges. The best roller is the cast iron section roller.

Corn is cultivated here mostly with the two-horse walking cultivator, of which there are more different patents manufactured here than any town in the United States. The best time to cut up corn is just after the first light frost, though if the corn is thoroughly ripe it may be cut before frost; but if cut green, while the weather is warm, it will invariably heat and spoil the fodder. The common straight knife is used for cutting; your hills are tied together at the top, the corn is then set up all around and tied near the top. The time for cutting small grain varies according to the kind of grain. All kinds of reapers are used; can't say which is the best. Those with droppers attached are preferred.

Shock and set up ten or twelve sheaves firmly, according to the size, cap them with two sheaves, well broken and spread over the whole.

G. W. Munier.—Yellow corn is usually preferred for feeding, and white for culinary purposes. Italian Spring wheat is about all we need here. Winter wheat will do in our woodlands, but is a failure on the prairie soil latterly. We have a large white or light yellow oats, much admired; rye, barley, and buckwheat are little raised, and less cared for. Prepare all lands in the Fall for Spring grain, except corn, and even for that, it often does well. Sow wheat and oats early as possible. Drills for wheat are out of use in our neighborhood, but it is thought they would do better than the ordinary broadcast method We have corn planters, of course, but I must be excused from advertising any one's unless I'm paid for it; if some one will make me a present of a planter, why, I'll give him my best wind. Diamond shaped harrows and log rollers; I know some one will call me "fogy;" no matter. Small rollers, with equal weight, for crushing clods Never saw any wheat hoed in any way. Cutting up corn belongs to by-gone days and dark corners of the earth. Cut small grains as soon as the kernels are plump; don't wait for them to grow hard and shrivel. Cut with a reaper, shock and stack out-doors; putting in barns invites all the rats and mice in the whole land. Yield—wheat, about twelve bushels to the acre; oats, forty. Not much troubled with insects in our small grains; army worm sometimes takes off blades, but his visits are at long intervals.

J. Robinson.—Our corn is of the common western varieties, the Dent corn chiefly, white and yellow. I think the large yellow, with deep grains, that fit completely together nearly the whole length of the grains, will usually average the most bushels per acre on our soil. To prepare the ground for corn, I would recommend 12 inches deep, if the teams are strong enough, from the 1st to the 15th of May usually, sometimes earlier or later, according to the dryness of the ground; it is useless to put corn into cold, wet soil. After plowing, I cross mark with a cheap and effective marker, constructed as follows: Pin three or more pieces of joist, 2 by 8 inches, two feet long, shaped like a sleigh runner, to a strong plank, the pieces being as far apart as you design the rows of corn to be; then pin or bolt on a piece of scantling or pole on top for a tongue; when ready for use, the cost will not exceed two dollars. A man and team can cross-mark from twenty to forty acres per day, better than he can mark eight or ten with a horse and plow; the furrows it makes are narrow and shallow, but distinct, the planter crossing them with much more ease than the furrows made with a plow. On ground free from weeds, I prefer to plant in drills four feet apart, and have the stalks stand one foot apart in the rows. Corn planted in this manner, on good clean land, will produce more corn per acre, with less labor, than in check-rows; but if the weeds get a start, it takes a great amount of labor to clean it. I have used the planters manufactured by G. W. Brown, *of Galesburg, and another by* Smith, of Peoria, and find both to

work. Care is required not to plant too deep, from two to three inches being sufficient depth. To till the crop, I first use a harrow, made in the shape of the letter A, with the foremost teeth twelve or sixteen inches apart, and six or eight teeth in each side; it can be used before the corn is large enough to use the cultivator; it serves to pulverize the lumps, and kill many young weeds, leaving the ground in good condition to follow with the cultivator. I use the cultivator manufactured by T. & H. Smith, Pekin, Ill. The operator walks. This implement can be used either with shovels or mould-boards, adjustable to throw the earth either to or from the corn; I find it to do good work, and costs about $20 each.

H. Sodowsky.—The best variety of winter wheat tried in this country is the Genesee; it ripens early and is not so apt to rust as varieties that ripen later. The Mediterranean succeeds well here; so does the Blue Stem, when the season is favorable. The best mode of sowing wheat is with the drill, when the ground will admit of it. Wheat is injured most by the winter freezing and thawing which spreads the surface, drawing the wheat out of the ground, and leaving the roots bare, which are killed by the dry weather and winds which blow the dirt from about the roots. Wheat that is sowed with a drill is in the bottom of the furrow; as it thaws and freezes, the loose soil rolls into the furrow, covering and protecting the roots from the wind. The best time to cut wheat is when the grain is in the dough; the grain is then plumper, fuller and yields more flour, whiter and better than at any other time.

W. M. Allen.—Best varieties of spring wheat, Club and Italian. Plow in the fall, and plow deep; sow as early as the ground permits. If the ground is clear of trash, the best method of sowing is by drill; if not, by hand. Brown's is the best planter. Use all kinds of implements for corn; all are imperfect. Cut corn as soon as there is no danger of its moulding, which depends, in great measure, on the weather. Cut wheat with reaper as soon as the younger heads are in the dough. Largest yield of wheat, 40 bushels; smallest, 6 bushels.

Geo. Harding.—Best varieties of corn are the clear white, and yellow; of wheat, Mediterranean and white winter wheat; white rye best; oats, English or black. Break your ground and harrow it well the first of September, for wheat and rye; first of April, for oats; for corn, plow deep and pulverize finely, as circumstances will permit. Plant from the 10th to 25th of May, with Dickey's drill or Brown's planter, and tend with some good two-horse cultivator, followed by a V, as long as possible, and lay by with a mould-board plow. One of the most valuable implements is the roller, which should be used whenever the condition of the ground will permit.

G. W. Vaughan.—The kinds of corn generally preferred here, are the large white and large yellow, for early planting; and the little yellow, for late. The large white was brought from Indiana, some years ago, by a man named Titus, and is called by that name. For fall wheat, the Genesee or West, and Mediterranean are preferred The Genesee is between a white and red quality, and is better than the Mediterranean for flour. The large white is preferable to any other for flour, but is so uncertain that farmers sow but little of it. For spring wheat, the Mediterranean is preferred, though many like the Canada Club very well. In oats, the common white is preferred to other kinds, as they are not so apt to blow down, and are much better to handle and feed. Rye, the large white, or blue stem Spring barley preferred. For oats, the ground should be broken up as soon as possible in the

spring, and the oats sown and harrowed in; the same preparation of the ground is requisite for barley; rye the same as fall wheat, of which I have before spoken; both should be sown early in September, by harrowing in or drilling. The ground for fall wheat should be prepared as soon as the oats are taken off, if sown on stubble. If on new or meadow lands, should be broken in the month of June, and the wheat harrowed in. I like the drill, if the land is rolling, but if flat, I do not, as the water stands in the drill furrows. I have never tried the broadcast drill. For planting corn, the ground should be broken up as soon as dry enough; it should never be broken up wet, as it becomes hard and seems to lose its vitality for the season. If the ground becomes very dry before getting it all broken up for corn, I roll it before planting; if not, I plant and roll it after the corn comes up. Brown's Illinois corn planter is preferred. I use my own make of rollers and harrows. I do not know of any patent rollers in the county. I think rolling is one of the most essential modes of cultivating corn that we can adopt; it is also splendid for wheat. I use the double shovel for plowing corn. I generally harrow my corn, or plow once and then harrow; I first use the roller, which pulverizes clods and makes ready for the plow. I have never used any of the riding plows; the Sucker State and Stafford have been used, and are very well liked—the Sucker State preferred I have never cultivated wheat by the horse-hoe, or any mode but rolling. Corn should be cut when ripe, unless the frost comes before that time—in that case, it should be cut as soon as possible. We use only the hand knife for cutting corn. Wheat, rye and barley should be cut while in the dough. Oats, for feeding, should be cut in the dough; for threshing, when ripe. The Ruggs, Kirby and McCormick reapers are all used—the Buckeye and Excelsior are preferred by me. Wheat I shock after the machine, and if the weather is dry, stand a week or two. Oats I let cure after they are cut, then bind and shock, and let them remain in that condition for some time, as they cure slowly, and are apt to heat in the stack if not very dry. I never put wheat in my barn, and but a small portion of oats at a time, as they draw rats and mice, who destroy a large portion of each, if put in for all winter. The largest yield of wheat on my farm was 28 or 29 bushels; average yield, not over 15 bushels. The largest of oats that I have thrashed, was 55 bushels; the average, about 40 bushels. The only insects injuring our wheat are the grasshopper and the fly. I know no mode of subduing either. The grasshopper injures the wheat in the early part of the season, and many farmers sow late on that account. I would always risk the grasshopper or fly to the winter freezing. The fly gets in the root in the fall, I think, and lays the eggs and they hatch in the spring, the young sucking the sap from the stalk.

S. Butler.—The speckled corn yields best; and fall wheat. Manny's machine has proved best here.

W. F. Bliss.—For oats, I prefer to plow in the fall, and drill in the oats as soon as possible in the spring, at the rate of about 2 bushels to the acre. For fall wheat, I would, if the ground were new, turn it over in May and June as shallow as possible, let it lie until September, then harrow, say four times, and sow with a drill, from three-fourths to one bushel per acre. I sow the May wheats, which are small grained, as near between the 20th and 25th of September as possible. I use the Hoosier drill, and find it good—perhaps it is the best; but I know the Sherwood, Buckeye, Belleville, President, and some other drills to be good. All drills with the so-called "slide" feed, I think, are to be avoided. If the ground were not new,

I would either "summer fallow" it or break it up as soon after harvest as possible; let it be until as near the 20th of September as you may, harrow twice, roll, harrow again once, roll again, and then drill from three-fourths to one and one-fourth bushels per acre, between the 20th and 25th of September. The more thoroughly the ground is prepared, the less seed is required. I begin cutting wheat as soon as it has gone into the dough. I use the Marsh harvester, which, with a driver and two binders standing on the machine, will cut from 6 to 12 acres per day, averaging, perhaps, 7 or 8 with moderate work. It will require, say, a man and a boy to shock it up. I put about 15 sheaves in a shock, including two cap sheaves, which are prepared by breaking down and spreading heads and butts, and laying on the shock. If winter wheat is well shocked it will go through a long rain without damage, provided the caps which blow off are occasionally replaced. I have usually stacked my wheat after it had stood in shock a couple of weeks, but the last two years have threshed directly from the shock with very favorable results—one year, one hundred acres, the next year, seventy-five.

D. Gove—Grains—the best varieties of corn that I have tried are known among farmers as large white, with a small seed cob, kernel very broad and deep, ripens well of a good season; I also grow a medium-sized yellow variety, which I like for feeding cattle better, as it is very productive and is not so hard for stock to masticate as the white. Of wheat, I like the white May best; it stands up well, ripens from the 15th to the 20th of June, and yields well and brings the best price in market. The black oats seem to do best with us, in as much as they do not grow so tall, and are less liable to fall. Our experience has taught us that the all-important thing about raising a wheat crop with us, is the preparation of the ground. I do not deem it essentially necessary to plow quite so deep as for corn, but it should be done thoroughly, and in August, if possible; then harrow and roll until we have all the soil *thoroughly* pulverized and *packed*, so that the roots of the young plant has a good chance to throw out its roots in all directions, and obtain a good *hold* on mother earth, so that the cold of winter can not kill it, nor the freezing and thawing of March can not release its hold upon the soil. I have no experience with spring varieties of wheat.

I like the Brown corn planter best of any that I have tried, and the McSherry wheat drill suits me best for putting in wheat; drilling wheat is much the best, and our best time for seeding is generally from the 15th to the 25th of September, and our best time for planting corn is about the first of May. I like what is known as the Scotch harrow best, and the best roller that I have used is one of my own constructing, the heads or ends are of cast iron, with wrought iron spindles, the drum is framed of 8x4-inch plank, mitred together and bolted to the ends, and dressed round and smooth; the frame is made strong, and is so constructed that it can be loaded to any desired weight; it also has a seat for the driver; the drum is 21 inches in diameter, a small roller of the same draft does much better work than a large one, in consequence of less surface on the ground at the same time. I have tried the different kinds of riding and other corn cultivators, but the cheapest and best are the double plows and double shovel. Our time for harvesting small grain is, for wheat, the last half of June, and for oats and hay, the first half of July. For harvesting, I have used both header and reaper; the header is the more speedy of the two, and the cheapest per acre; but when we consider the loss in *weight* and *quality* in the berry when it gets dead ripe, as it must do to be safe to head, it is a *question*, and a *question of great* importance, too, whether it is really cheaper in the end to head or

reap; my own opinion is, that, when labor can be had at reasonable rates, it is the soundest policy to reap, and to do it when it will yield the greatest amount of No. 1 flour. My average yield of wheat for 20 years, has been about 20 bushels per acre, and the largest yield, about 30 bushels.

J. G. Swann.—Large, yellow and flint white corn; red and white early May wheat; beardless. For fall wheat, double breaking fallow ground; harrowing, rolling and drilled. McSherry's drill; A harrow; wooden rollers. Corn planted four feet square and cultivated with double shovel plows five times; three stalks in a hill; cutting corn, 20 hills with sword knife. September. Wheat and oats stacked. Yield of wheat, 20 bushels; of oats, 40 bushels.

J. Balsiger.—I plant the common white and yellow Dent corn; have tried other kinds but found these best and most productive. No spring wheat is sowed here, as it is too uncertain. The kind of winter wheat we mostly sow up to this time, is what is called the "May wheat," a red, early kind, with a small kernel; but new kinds are introduced now, which are growing much in favor. The Tappahannock white is an excellent kind, doing well and selling better than May wheat because of its color, its greater weight and larger grain. Another kind, the Walker or Zimmermann wheat, amber color, presents about the same advantages, except that it is later. The oats we raise are the common white oats. Rye, barley and buckwheat are hardly ever sown in this neighborhood, wheat and oats bringing surer crops and greater profits. For corn and oats (except if corn stubble) the ground is plowed, if possible, once late in fall or through winter and then again in spring for oats as early as possible. The seed is then sowed broadcast at the rate of about 1¼ bushels per acre, and then well harrowed in. Corn land when plowed is harrowed also, then laid off both ways at four feet distance, with a corn-marker—a kind of sled with 2, 3 or 4 runners, drawn by a pair of horses—then the corn is planted where the lines made by the marker cross each other, 4 to 5 grains to the hill. Some plant it by hand in the old way, and some with hand corn planters. Brown's two-horse corn planter is much used also, particularly by large farmers. For this the land is laid off but one way. There is much time and work saved by these corn planters, but if the seed is carefully dropped by hand, the number of kernels in each hill can be more exactly regulated, and it will often, in wet springs, especially, come up better. This is the cause why small farmers, and some large ones, have not yet abandoned hand-planting. Some use an implement for covering the corn planted by hand, with a horse, which does the work of 2 or 3 hoes.

It resembles, somewhat, a small harrow, and runs astride on the row. On the forward part are two harrow teeth for pushing aside cornstalks and other trash that might be in the way, behind these are two cultivator teeth, somewhat turned toward the row, and running close to it, covering it up, and at the hind part is adapted a small wooden roller, which crushes the clods that might have rolled on the corn. This corn coverer works very well with a steady horse and on clean land. When the corn is up it is cultivated commonly with a one-horse corn plow, or the single or double shovel plow. The two-horse cultivators are not much used yet. The corn is commonly cultivated four times, crossing each time the furrows previously made. The first two times the soil is turned from the rows, and the two last times they are hilled. Corn is cut up for fodder when the ears are ripe, but the stalks and leaves yet green, or if an early frost kills it too soon, then without delay after the frost, before the leaves have had time to dry and be blown off by the wind. Some think

the corn fodder in this case to be of as good quality as that cut before frost. I do not see any great difference myself. As soon as cut up (with common corn knife) it is set upright in large shocks or stooks, which are tied with a band of some kind in order that the wind may not blow the stalks off. Each farmer cuts up as much corn for fodder as he thinks he will want for feeding, corn fodder being rarely sold; the rest of his corn is left in the field till dry, and then, commonly in December, the ears are gathered in wagons and hauled home into the crib. Some farmers then drive their cattle in the fields for the purpose of letting them glean whatever food there is left for them, consisting of a few ears and nubbins that may have been left over, the dry leaves and smaller parts of the stalks, or rather the tops. The dead cornstalks left are broken down some cold day in winter, when the ground is bare, by dragging a heavy pole, to which a pair of horses are hitched by long chains, cross-ways over the rows. Before plowing (corn stubble is commonly plowed but once before planting) some rake the stalks together and burn them; some plow them under.

For wheat, the ground, if oat or wheat stubble, is plowed shallow as soon as the crop is hauled off, and then again early in September, rather deep, say 7 or 8 inches or deeper if the strength of the team permits it. Then the field is harrowed and the seed drilled in at the rate of one and one-fourth to one and three-fourth bushels per acre. I have not observed any considerable difference in the several drills I have used or seen. They all do their work about equally well. Last fall, when the soil was so dry and cloddy, some rolled their land after harrowing and before drilling. The rollers used here are common wooden ones, single or double. The harrow used by some is the old triangular one; others have quadrangular ones—the hind part a little wider than the fore part, with cross bars. They possess a greater number of teeth and make the ground finer. Wheat is ripe here commonly towards the end of June or first of July. Many—and I believe they are right—prefer cutting their wheat before it is dead ripe, *i. e.* before the grain is hardened and while the straw is still a little green, it will be of better quality. Also for oats, the straw of which makes it better fodder for cattle or horses. Oats are ripe from one to two weeks after wheat, the latest about the middle of July. Some of my neighbors, though very few, use headers. They do more work than reapers, but there is greater risk of loss in case of sudden showers while the stacks are building—barns or sheds for grain not being much in use yet. Sometimes there is also considerable loss if the stacks are not well finished or covered, if wet weather sets in before they are threshed. On the field there is also more wheat lost if it is of unequal height or some of it lodged. They need the same number of hands as reapers. Many farmers here use Kirby's reaper and are well satisfied with it; it is also a good mower. Others prefer McCormick's.

As soon as the wheat or oats are bound they are set up in round shocks of from 15 to 20 bundles or sheaves, and covered with two other ones as caps. These are commonly placed crosswise on the shocks, breaking them in the middle and spreading out the buts and ears well, so that the shock be well covered and the wind can not catch them so easily and blow them off. These shocks are left in the field for a few days until the farmer finds time to haul them to the stack yard, where they are put in the common way in round, square, oblong, or oval stacks, laying the outer rows of sheaves slanting, so that they will shed off the rain to the outside.

The largest average yield of wheat is from 20 to 25, rarely 30, bushels, and oats from 40 to 50. The insects which injure the grain are the chinch bug and the

Hessian fly. The former does not hurt wheat much because when the insect appears in great numbers wheat is commonly nearly ripe and out of its reach; but in oats, and still more in corn, it often causes considerable loss, sucking up the sap of the stalk, and making the plants die before they have perfected their grain. There is no remedy known here for them, except when corn is near a wheat field infested with bugs, to sow a strip of land between the two fields in oats, which will attract and stop them at least for a time. The Hessian fly seldom does much harm, except in wheat sown too early. If sown about the last week in September it will escape the fly.

J. Y. Bothwell.—I prefer what is called the Strawberry corn. Plow deep as possible in April and May. Plant a bushel on six acres. Use Brown's Illinois corn planter. Cultivate with double shovel plow and Stafford's sulky plow. Plow three or four times. Wheat: Mediterranean is the surest crop. Break land in June for wheat, as above. Do not *re-break*. About the last of August, or sooner if the season is wet and the land gets "foul," I give it a thorough harrowing with a joint harrow, with teeth two and one-fourth inches apart, made of steel and sharp. Commence seeding the first week in September, previous to which give a thorough harrowing. Use a drill. Drill both ways, the first time drill the way I plowed. One-half bushel per acre. Roll the ground with a large frame roller, then drill the other way. Three-fourths bushel per acre. Let this be the last thing, except cleaning out the furrows between the lands. I use the Buckeye reaper for cutting wheat, and cut when it is in stiff dough. Shock in the field, let it stand a few days, then haul and stack where I want the straw for stock to go to in the winter.

T. Engelmann.—Inasmuch as corn is not raised for market, but for home consumption only, not much care is taken in the selection of seed corn; yet the pure white corn is most generally planted, although the yellow is considered to yield a heavier crop.

Spring wheat is not raised in this neighborhood; experiments made some years ago turned out failures.

The fall wheat most generally sown is May wheat, or Genesee May wheat, white wheat, and Mediterranean, commonly called Bull wheat. The wheat harvest commences about the middle of June; the grain is cut with the reaper or self-raker; headers have been tried but failed to give satisfaction, and are discarded. The grain is stacked or put up in ricks in the field or yard, and threshed by horse or steam power. Barns of sufficient capacity are not in use.

As soon as the crop is removed from the field the stubble is broken and the ground is again plowed, harrowed and rolled, before it is re-seeded—which is always done with the drill—in wheat. In former years this was done in September; of late, since the Hessian fly has made its appearance, it is done later in the season—in the latter part of October and beginning of November. The best yield of wheat is about 33 bushels to the acre; average yield about 22 bushels. Rust and Hessian fly are the drawbacks on the cultivation of wheat; early sowing is considered the best preventive of the former, and late sowing the best remedy against the latter. A dilemma!

G. C. Eisenmeyer.—Not much can be said on corn. It requires good rich land and very good tillage; the large white corn is here generally cultivated. We have a little red corn which ripens in 90 days and makes excellent fodder.

Wheat is the great staple, and so far has proved very remunerative, especially during the last few years. Tennessee May wheat, Tappahannock, and Mediterranean, are the kinds which are generally cultivated. The two first named on rich land, the latter on thin and poor land.

The time of sowing is from the 15th of September to the 15th of October. It is invariably sowed with drills, of which there are a great many different kinds, all equally good. It is supposed, and advocated by some, that harrowing wheat in the spring is an advantage to it, but I never see it practiced. The horse hoe for cultivating wheat is r—

used here. Manny's, McCormick's and Geis & Brosius' reapers are in general use. Headers are not much used here, and perhaps will never be a popular machine. The largest yield of wheat is 40 to 45 bushels per acre; the average yield 15 to 20 bushels. Wheat is generally cut here between the 15th of June and 4th of July. It is tied in small bundles, set on end in shocks of from 20 to 25 bundles, and stacked or hauled into barns as soon as cured, which is in 8 or 10 days.

Insects are the Hessian fly, grasshoppers and chinch bugs. We know of no remedy as yet, neither are they very injurious.

7. **Root Crops.**—Best varieties of Irish and sweet potatoes, turnips, beets and carrots: time and method of preparing ground: mode of planting, method and means of cultivation: largest and average yield: methods of digging and keeping: cost and value as compared with grain crops for feeding: insects and diseases?

E. Moss.—Irish potatoes, turnips, beets, carrots, with manuring, raised in moderate quantities.

M. A. McConnell.—We grow all Irish potatoes. The best is the cracker and peach blows. We think rutabagas, carrots and sugar beets the best for stock, especially for sheep and milch cows. The yield is generally good, and the expense is very small.

H. Pierce.—Early York and peach blow potatoes are the best. Have not tried early Goodrich or Harrison. Yellow and red Nansemond sweet potatoes. White flat Dutch turnip. Sugar and blood beets. No carrots raised in quantity I believe. Potatoes are planted in hills. Do best in fall-plowed land. cross-plowed in spring and harrowed deep. Cultivate with horse. Use common plow the last two times, and hill up well as early as possible. Plow out and dig with fork. Ten-lined bug was very bad in 1865, not so bad in 1866, and nearly gone in 1867.

J. Tefft.—Of Irish potatoes, the peach blow is considered best with us. Taking one year with another they succeed well on new land, or land that has not been long under the plow without rest. Plow deep; plant in hills; cultivate with small plow and hoe.

S. Ryan.—The best variety of potatoes is the long, flat pinkeye. The surest crop is from the Michigan peach blow. The vines are so tough the bugs cannot kill them, and so large and numerous they endure drouth well.

C. E. Barney.—Lay potatoes on well-prepared ground early in the spring, cover them with 10 inches old straw, pitch off the straw after the vines are dead, and pick up the potatoes.

Do not know enough about roots as compared with corn, for feed, to venture an opinion. Shall try turnips for sheep as a sanitary measure.

A. Rankin.—The white peach blow potato is considered the best here. Plow deep, harrow well, and plant from the first to the fifteenth of May.

The long orange carrot is the best for a field crop; they are a sure crop here. I am the only one in the country that raises them as a field. I think every farmer ought to raise them, as I consider them the best possible feed, when used with oats, in the early spring, particularly for cows and all young stock. They can be raised for about 10 cents per bushel; yield 400 bushels per acre. Preparation of ground, same as for potatoes.

Average yield of potatoes, 150 bushels per acre. I raised last year 241 bushels per acre, at a cost of $41 per acre. The presence of bugs added largely to the cost of production, but they never have injured my crop, nor do I think they ever will while I have my health. I shall plant quite a variety this spring. Potatoes and carrots should be kept perfectly clean. I dig both with the potato fork.

G. W. Minier.—Peach bloom and early Goodrich, best of Irish potatoes, and Nansemond for the sweet. Other root crops raised but sparsely. Sometimes get large crops of potatoes. Average yield about 100 bushels. More valuable than any grain crop. Not so valuable as corn for feeding. The Colorado potato bug is our great enemy. I think *he has* come to stay. He is now snug in the ground, ready to come. Set the boys to pick

them off. One little fellow told me it was no use; he said they ate up an acre before breakfast, and then got on the fence and asked every passer by if he had any potatoes. Don't vouch for the lad's story.

J. R. Tull.—I have had considerable experience with potatoes, especially sweet ones; which I find the most profitable root crop that I can raise. My average yield per acre is about 200 bushels; the market value of which is from $1 50 to $2 per bushel in the fall, at digging time, and in the spring from $3 to $5 per bushel, for seed. The small potatoes, not saleable in the fall for family use, are what I reserve for seed. This makes the land clear me, over all expenses, more than $100 per acre. I find the yellow and red Nansemond the best varieties for this latitude. They are of easy cultivation, requiring little more labor than Irish potatoes.

The land wants to be plowed deep, early in the spring as possible, then let it lay until the plants are ready for setting out; before putting them out, give it a second plowing and pulverize it well; then with two horses and large plow throw two or three furrows together for a ridge to set the plants on; making the ridges four feet apart from top to top. Do not make a large ridge, nor a broad one, but rather sharp; about 6 or 8 inches flat on top. Set the plants out in the afternoon, pouring a little water round each one. Throw a little dry soil over when the water is soaked away. Set the plants 16 inches apart on the ridges.

The ground being clean when the plants are set out, twice working will generally be sufficient; but if not, they must be kept clean until the ground is sufficiently covered with the vines to prevent any weeds or grass from growing. The main difficulty with the sweet potato is keeping them through the winter, which cannot be done in this climate without a building made for the purpose, where the temperature can be kept at about 55 degrees Fahrenheit. The difficulty in procuring seed and plants discourages many from engaging in the culture of the sweet potato.

Of Irish potatoes, the Neshannock, pinkeye, Baltimore blue, peach blow, and a few others, have been grown. The last mentioned has given the best results, while the Neshannock and others of the older sorts seem to be deteriorating. The very new sorts I have not tested. Of sweet potatoes, the yellow Nansemond takes the lead; though last year the red Bermuda was tried with good success. It will ripen a month earlier than the Nansemond, and is prized as an early sort.

The Colorado bug made its appearance here in 1864, and was very destructive. Since that year it has annually made its mark in the potato fields, but is gradually becoming less troublesome—partly owing, perhaps, to its insect enemies, and partly to the fact that its habits have become better understood.

H. Sodowsky.—The best variety of Irish potato for general use is the peach blow. For early potatoes I would plant the early York. It yields a good crop and comes early. We have had plenty by the middle of June for three years past, which is as long as I have tried them,

G. W. Vaughan.—The Neshannock is preferred for an early Irish potato; the peach blow for a late, and the large red for a sweet potato. Ground for potatoes should be well manured and plowed deep. The Irish should be planted in hills, or drilled in rows; the sweet in hills, mounds, or in ridges 12 to 15 inches apart. Turnips should be sown in July or August. The ground should be plowed in the spring and again when the seed is sown. Beets and carrots are little raised here, only for table use. I tend Irish potatoes with hoe and double shovel plow; sweet potatoes with hoe. The potato bug often destroys the tops of the plants, injuring them badly. I know no way of destroying them. They are sometimes driven from the vines by brushes, commencing at one side of the patch and following each row up and down until they leave. Potatoes keep best where there are no cellars, in old chip piles, or covered with earth and then with stable or barn yard manure.

J. G. Swann.—Neshannock and peach blow in drills 18 inches apart. Two hoeings and one plowing. Sweet potatoes, large ridges 18 inches apart. Hoeing and plowing. Largest yield of sweet potatoes, 100 bushels; of Irish potatoes, 200 bushels. With plow and harrow. In long rows, covered well.

E. A. Riehl.—Best sorts of Irish potatoes are early Goodrich, Harrison and peach blow; the latter rotting badly and almost discarded. Plow deep. Plant as early as possible in spring, in rows three and one-half feet, and 18 inches in the rows. Cultivate with cultivator and shovel plow. Sweet potatoes: Yellow Nansemond and Bermuda, best in order named; have had Brazilian one year and do not like it. Nansemond best in quality and earliest ripe. Bermuda is at least twice as productive, producing nearly all large potatoes, and of medium quality. Plants grown in hot-beds in spring, and planted 14 inches apart on ridges. The ridges made by horse power with a machine made for this purpose (cut and design in Nos. 10 and 2, Farmer's Advertiser), cultivate well and harvest just before frost. Find it most profitable to store and keep over winter, selling them during winter and spring, for from $2 50 to $3 per bushel; and the small ones for seed bring from $8 to $15 per bushel in the spring. To keep them successfully they must be ripe, dug in dry weather, handled as carefully as eggs, so as not to bruise them, packed in small quantities in dry sand, and kept at a uniform temperature of from 45 to 60 degrees Fahrenheit.

J. Balsiger.—I possess very little experience in root crops, excepting the common potato. I have tried some beets and carrots on a very small scale. In seasons not too dry they did tolerably well, but it takes much time to keep them clear of weeds when small. Cattle like them, and I am led to think that they make excellent feed for them, particularly for milch cows. My intention is not to give up these trials; and I will report in future time on them, if I am able. Sweet potatoes did not do well with me, and I have given up their culture. Irish potatoes bring better crops on well prepared and deeply plowed land, and well cultivated. We also found covering the land after they are planted, at least six inches deep with straw, a very good method. In ordinary seasons they will bring good crops in that way, and they need not be cultivated. But I prefer to plow the land three or four times; the last to a depth of 12 to 15 inches, planting them deep, without any straw, but cultivating them well, and keeping the ground clear by hoe and shovel plow. I had, last season a very good crop on a small piece of ground which I had prepared from 15 to 18 inches deep for planting grape vines, the great drouth notwithstanding. Others covered with straw, on land of the same quality, and plowed at least eight inches deep, brought not so good a crop. The best time for planting is very early in spring, in March if possible, and then about first of June. If there is an early frost in fall the latter may perhaps not get ripe; but if there is no early frost, they bring me commonly a very good crop of good potatoes. They are dug with hoe, spades, or forks; if plowed up a great many are lost. They are kept in the cellar, or, where there is no cellar, left in the field on a dry spot, well covered up with straw and earth, at least 18 inches deep. A good average crop is 20 bushels from one of seed. I have raised 39 bushels from one. The best varieties for quantity and quality are the peach blow and the early Goodrich, and the Cusco for quantity only—its quality being inferior to the others. The pinkeye rusty-coat—a Goodrich seedling—is also a good kind, bringing good crops.

We have nearly every year in our plantations the common potato bugs (cantharides), and now, for a year or two, the Colorado potato bug. The former can be driven off by striking the vines with brush; for the latter I tried several means without avail, except hand-picking.

T. Engelmann.—Root crops are not raised for marketing. Every farmer plants a patch of potatoes for his own use. In the spring, generally in April or beginning of May, the ground is plowed and harrowed, and the potatoes are planted in shallow furrows, about *18 inches apart* each way, and covered about 2 or 3 inches deep with soil, and then about

l0 inches deep with straw. This is all the labor which the potato requires until dig- time; and in this way good crops have regularly been obtained, and potatoes of ior quality. Flukes, peach blows and pinkeyes are generally selected for seed, but nuch care is taken to keep them pure.

Barber.—The Irish potatoes which succeed with me are the Peach Blows and Early s. Of sweet potatoes, the common Southern, Nansemond and Bermuda, all do well. ground is deeply plowed in the fall, and the Irish potatoes are planted early in the g. Late planting does not often succeed, on account of the hot, and often dry hs of July and August. Sweet potato plants are raised in a hot bed and put out as as the season will permit, in order to start their growth before the hot months come The digging is done with a fork. Irish potatoes are kept very easily, by putting in heaps on the ground, covering with straw and earth deep enough to prevent ing. Sweet potatoes are much more difficult to keep; I have succeeded very well eeping in a dry cellar, covering with flax straw, and never allowing the temperature ll below 40°.

Legumes.—Best varieties of peas and beans: their management: cost and value as feed ?

A. McConnell.—Pea and bean crops don't pay, for feed.

Pierce.—Peas are not sowed as a field crop. Tom. Thumb, for early, and Champion ngland, for late, are the best varieties. The small navy bean is preferred.

Tuft.—Small navy bean, plant in hills, 16 inches apart. Use cultivator and hoe. never raised for feed.

Gregg.—Peas are never grown here as field crops; beans not often. The white bean is usually planted for that purpose. For garden culture, I have had good suc- with the early Mohawk, early six week, Valentine, and Lima.

W. Vaughan.—Sometimes raise a large quantity of beans, by sowing like oats or at, in the month of June. This is the cheapest way of raising the navy bean; it s down the weeds and bears abundantly, and if the fall is dry we save all; if not, y rot before they are ready to gather.

Balsiger.—Peas and beans we raise only in the garden, for our own consumption. like best the Tom. Thumb, Eugenie and English pea; and the yellow dwarf, six ts, and Lima bean. All these, except the latter, are badly infested with the bug y year.

Textile Plants.—Your experience with flax, hemp and cotton: best varieties, method o ing, cultivating, etc.: value as a farm crop?

Moss.—Some flax raised; is valuable both for the lint and seed.

A. McConnell.—We have grown flax and hemp, but they don't pay as a farm crop.

Gregg.—Flax, hemp and cotton are seldom seen growing in this county, though all been. The first is grown less rarely than the others.

Butler.—Flax is a good crop here.

Balsiger.—With flax, hemp and cotton I have had very little experience. I have hemp growing spontaneously in the neighborhood, to a fine size. Flax and cotton l cultivate for one year; they did well, as far as I could judge; but as I had no hinery to prepare those products for the market, or work them up, I discontinued r culture.

Ground Plants.—Pumpkins, squashes, watermelons, etc.: management, cost and value field crop: insects and diseases?

Moss.—Raised in moderate quantities.

M. A. McConnell.—We think pumpkins pay big for cattle. I feed them cut in the fall to milch cows improves the quality and increases the quantity of milk in all cases.

H. Pierce.—The common sort of pumpkin is planted sometimes with corn, and is fed to cattle and hogs in fall, preparatory to feeding corn, and sometimes as alternate feed. Hubbard squash is the favorite. Watermelons, on a sandy soil, 6 miles east, are raised as a field crop.

J. Tifft.—Only raised amongst corn. Have no idea of cost or value of crop. Striped bug.

A. Rankin.—I think pumpkins and squashes, when fed to stock in the fall, are about equal to good grass pasture, and would recommend farmers to raise them for feed, just before winter sets in, as they can be raised at very little cost.

T. Gregg.—The Hubbard and Boston marrow squashes, I have found to be the best for garden cultivation.

G. W. Vaughan.—Ground plants are generally of little value, as a field crop, and few raise them, save for their own use. Pumpkins and squashes are generally planted with corn, but not extensively. Small striped and black bugs often destroy the young plants.

E. A. Riehl.—Of squashes, I consider the Hubbard and American Turban the best; of watermelons, the Ice Cream is superior to all others; Ward's Nectar, the best of the musk varieties.

J. Balsiger.—Pumpkins, squashes and watermelons do well on rich land; the former are commonly planted with the corn, and fed out to cattle and hogs; but as far as I could see, neither were very fond of them. Squashes we raise for our own use, but with great trouble defend them from the ravages of the big black bugs which destroy the plants. We know of no other means of destroying these pests than by hand-picking the insects and their eggs, and crushing them.

J. Barber.—Pumpkins, squashes and melons succeed well by planting on newly turned sod, fresh timber land, or by manuring in the hill, when planted on old land. The greatest enemy is a small striped bug, which attacks the plants when quite young; it will even eat the young and tender squash.

J. Warder.—I have paid some special attention to growing watermelons. I break my ground deep, plant about 10 feet apart, manure in the hills, and thin to one vine; keep the ground well stirred with shovel plow until the vines begin to run, then smooth the surface with a harrow, and keep clean with the hoe. I sold, last year, fifty dollars' worth, raised on a piece of ground 35 yards square (just one-fourth of an acre), besides what were eaten by my family of six, and goers and comers. Average price, 15 cents; commenced ripening the first of August.

11. MISCELLANEOUS.—Hops, tobacco, broom corn, sorghum, onions, chiccory: growth, management and value as a farm crop?

M. A. McConnell.—Hops are a good crop, but we don't grow them; they will, with care, pay as a farm crop.

H. Pierce.—Hops and tobacco are not grown except for home use in gardens. Broom corn, 8 miles south, is raised in large quantities, and is the most paying crop. The Otaheite sorghum is best, producing from 50 to 200 gallons per acre. Not much sorghum will be planted this coming summer (1868) as there is but little sale for the molasses.

C. E. Barney.—No experience with sorghum; I think the venders of the machinery make the most money.

V. Aldrich.—My experience with sorghum is limited, having raised only enough for home consumption. I have always done that, not using any other sirup, and but very little sugar. The largest yield I have ever had, was 120 gallons, from one-half acre; raised on high dry prairie land, that you might call rich. The last of April, I planted

hout soaking the seed; it came up well, was plowed three or four times, and hoed se, and kept clean from weeds. It matured the first of October, and was then worked; eds being all black and stalk giving a yellowish cast. Kept no account of cost of crop. old 70 gallons, at $1 per gallon, reserving the remainder for my own use; at the same ce, I would have made $120. Expenses did not exceed $50, and probably, not more an $35 or $40. We then had war prices, now they are nearly one-half less. The cane s run through a cast iron mill, with three rollers and one sweep; used one horse, or pan. Evaporate in plain pans six and one-half feet in length by three wide; one l one-half inch wood sides; eight inches deep, with sheet iron bottom. I have a ck furnace, just large enough to take on the pans; these pans hold 85 or 90 gallons. first we filled the pans full, and had to boil slow to prevent their running over; this dered the process of evaporation so long that the sirup became very dark. By filling pan half full, we found we could boil with full force and evaporate very quickly, king clear, light sirup. It is important to stir it constantly when nearly done. When ne, set or slide the pan off the furnace to one side, putting another pan of juice in its ce, so there will be no loss of heat from fire. At the same time, continue stirring the up just off, as this makes it of a much lighter and handsome yellow color. When it partly cool, it can be put into the cask, or some vessel to entirely cool. Keep the pans shed clean, ready for use again by the time the sirup over the fire is ready to come

Press out the juice just as fast as wanted and no faster, for the sooner it is evapo-ed after pressing, the better the sirup. My mill cost $44; the flue took about 1,000 cks, costing $10; the work I did myself; the pans cost $10 more; the whole expense ed not exceed $75, for farm or family use. I rent my mill out to neighbors, at $2 for hours use, and in this way it has paid for itself. But without renting a mill, it will y any farmer to raise sorghum enough for his own use. It should always be planted t before corn planting, and not left, as is usual, until everything else is planted. ould be plowed well and hoed, and put on good ground to realize a profit.

I. *Rankin.*—I consider sorghum a very profitable crop. Decidedly the best ground sorghum is new prairie, high ground; it also does well on clay soil. Avoid all urse manure. Yield of molasses per acre, 200 gallons. I have raised onions, but did t always find them profitable. Yield, from 50 to 400 bushels per acre.

G. W. Minier.—Nothing but onions; these pay well.

T. Gregg.—Hops and chiccory have not been grown here; tobacco and broom corn, dom; onions, never, as a field crop. Sorghum is produced to a more limited extent an formerly. Such soil as mine will yield 200 to 250 gallons per acre of sirup, with od culture; though the amount usually reached does not exceed 150 gallons. My l has produced sirup of a very fine quality. Two-horse iron cylinder mills are in most nmon use, with home made, sheet iron and zinc evaporators.

G. W. Vaughan.—I have no experience in hops, none in tobacco, and do not use it in y way. Onions I raise for table use only. Sorghum and broom corn look much alike, d are weakly when young, but grow fast if tended well. They need faithful hoeing to rive.

S. Butler.—Broom corn a good crop here.

J. G. Swann.—Tobacco, broom corn and sorghum pay well.

J. Barber.—Sorghum succeeds in the same soil, and is cultivated similarly to corn. It not cultivated to the same extent, in this vicinity, as formerly.

J. Warder.—I know but little about the cultivation of hops, but should judge they uld do well on our soil, as I have found them here frequently growing wild. About ten ars ago, I grubbed up a vine in a clearing, brought it home and planted it near the rch; it bore hops in the greatest profusion, and formed in summer a grateful shade, thout cultivation.

12. ORCHARD FRUITS.—Apples, pears, peaches, cherries: preferred varieties for various purposes: preparation of ground: planting, cultivation and pruning: gathering and keeping of fruit: packing for market: fruit houses aud cellars: value of orchard products as a farm crop: insects and diseases.

E. Moss.—Many varieties of apples, as well as pears and cherries. Cultivate ground deep.

M. A. McConnell.—Apples are the only sort of orchard fruits that can be grown.

H. Pierce.—Apples for market—early harvest, Carolina Red June, Benoni, maiden's blush, Jonathan, willow twig, Ben Davis, Rawle's Janet, yellow bellflower, and wine sap. Pears—Doyenne d' Ete, Rostiezer, Tyson, Bartlett, Buffam, Louise, Bonne de Jersey, Beurre Diel, Duchesse d' Angouleme; all blighted last year (1867), but these are the best. Cherries—early Richmond, late Kentish or pie cherry of N. J., English Morello, May Duke and late Duke are about all that do well here, except the common Morello.

Prepare the ground as for corn; open a furrow or dig a hole about 12 inches deep, 2 to 3 feet across; set from 18 to 30 feet apart; cultivate first and second year in corn, and frequently longer, and then in small grain for a year or two; then seed to clover—is the common practice. Gather by hand, put in barrels or open boxes, but generally market in the fall; pays best of all.

The bark louse is our worst enemy on apple trees.

J. Tefft.—Summer apples—early harvest, Carolina Red June, Lowell, Keswick, Codlin, sweet bough. Fall—Cooper's early, Colvert, Dowse or Hawley. Autumn—strawberry, maiden's blush, porter, snow. Winter—golden russet, Baldwin, Dominie, Eng. russet, Esopus Spitzenberg, fall pippin, wine sap, green sweeting, limber twig, northern spy, R. I. Greening, Roxbury russet, Janet, Swaar, W. W. Pearmain. The Hawley and R. I. Greening grow very fast, if manured, and are consequently tender; but if grown slow and headed low, succeed well. I have my pruning done any time between the first of November and the first of March, when the wood is not frozen.

Pears—Bartlett, Flemish beauty, Madeline, Swan's orange, Easter, Buerre, and Seckel.

Cherries—Yellow Spanish, Elton, Kentish and early Richmond. There are other varieties that it does not pay to raise.

No peaches raised.

The apple worm (*Carpocopsa Pomonana*) causes many of our apples to fall, and renders many more almost worthless. The Borer (*Saperida Bivittata*) does much injury to our apple trees, unless watched and removed early. The caterpillar (*Clisioacampa Americana*) at times is troublesome. The bark louse (a species of coccus), injures our trees more perhaps, than anything else in this section.

The winters are too severe for peaches. I had 800 trees, they bore a large crop when six or seven years old, and the next winter, some twelve or thirteen years ago, they all froze, and every tree died; at that time, I had an apple orchard of 900 trees; the same cold winter destroyed nearly one-half of them; the best varieties suffered most. I find the best trees for an orchard are those budded the second year from the seed; reject the very largest and all the little, stunted ones. I will here remark that all fruit and forest trees, corn, and many vegetables, as well as pigs, calves and other animals, that are stunted when young, never fully recover.

The object of the seedling is that it has a finer and firmer wood and bark than many of the grafted kinds; and I have observed that the finer and harder the bark, the better the tree will bear.

I have a number of trees the barks of which are so soft and thrifty that they never bear. Last June I took a section of the bark, 1½ inches long, from round the body of the tree, and inserted a corresponding section of bark from the crab apple tree, tied it on; it grew fast. I tried this on several with like success. According to my philosophy, they will bear every season; if so, you will hear from me again. I do my trimming in February *in order that* the wound may season before the sap starts. Small limbs, less than half

n inch, I cut off close; but larger than that, I cut from one inch to two feet, according o size of limb. I cultivate the orchard when young; mulch with straw after seeding. he bark louse is very injurious to orchards here. The caterpillar is quite a pest on the rairies, but near the timber, the bluejay eats the eggs before they hatch.

O. E. Barney.—The variety of apples that will bear most on a given farm, are best for iat farm. An indifferent apple that will *grow* is better than a delicious one that will ot, for profit.

V. Aldrich.—Apples preferred for family use, are early harvest, red June, and red strachan. These three varieties are earliest, and the fruit is of the best quality. The arly harvest bears only on alternate years, and then not more than half the quantity iat trees of the same size do, of the two other kinds. The golden sweet for baking, and aten with bread and milk and a slice of new milk cheese, will relish first rate—I was oing to say it would make a man fat. It is one of the best dishes that can be used for apper, creating a sweet, sound sleep, so desirable after a day's hard toil.

For late summer apples, I consider the Lowell, Porter, maiden's blush, and early Pen-ock, best. The St. Lawrence is a fine apple, but decays very soon.

The fall Dyer, which I send out from the nursery as Tompkins, is the best of all fall pples. The tree is hardy and a great bearer every other year. I have four trees, all set ut at the same time, and of the same age; two of them bear one year, and the other two e next, so that I always have plenty. This apple sells better for eating than any other ariety I know of, in fact, it is better than most pears, having the pear bloom and being nore juicy and fine grained. Another good quality is its gradual ripening, lasting in eason for a long time.

All the above varieties are as good for market as for the family at home.

The snow or Famuse is a good late fall variety, and keeps very well into mid-winter, rith careful handling; its liability to drop is against it.

For winter family use, I prefer the Jonathan, Wagner, Dominie, R. I. Greening and ed Canada. These are all of the first quality, or near enough. None of them are long eepers. The Jonathan, Wagner and R. I. Greening are all liable to drop early, and ust as soon as they begin to grow ripe and drop, they must be picked and kept in a cool, ry place. Apples that have dropped and lain on the ground a few days, and been rarmed by the sun, will not keep, as that sends them into the ripening process, and can ot be arrested. No matter how sound they may look, they should never be mixed with hose picked off the tree, unless they are all soon to be used up.

The above are my favorite varieties for eating, and are equally good for culinary urposes.

The ladies' sweet, for winter, is the first best for eating, and keeps very well. Smith's ider is also a fine apple for keeping and eating.

The New York pippin or Ben. Davis, and willow twig, are good bearers and long keep-rs, but third rate quality; good for cooking, and will eat very well when other better orts are gone. In fact, these two varieties are almost invariably used before reaching aturity, and then condemned as to quality, when if left until April, May and June, they be-ome ripe and relish well. These two sorts are the most productive varieties I know about. he Ben Davis bears often at four years from the graft, and continues to bear almost every ear invariably, though not always in the same proportion. The willow twig does not come nto bearing so young by two or three years, and is not quite so likely as the other to roduce a full crop every year, but is among the best bearing sorts. So far as I know, iese two kinds are the most profitable for market on the whole list; always fair, large ze, never scabby, and very showy.

But for market purposes, one must have a good assortment of varieties, to please the arious tastes and fancies of customers, especially for the early winter trade, as people ill not buy these long keepers to use in the late fall and early winter; and to retain ustomers, you must have what *they demand.* Customers will always take the

share of any sort of long keepers; this remark applies to those who buy their supply of apples at the time of gathering in the fall. For late spring sales, we must rely solely on the best long-keeping varieties.

Pears and peaches, as yet, have not proved profitable, but should be on every farm, in limited quantities. The pear has but one serious drawback, the fire blight. Our cold winter destroys the peach crop in this vicinity, three years out of four.

Of cherries, the most profitable is the early Richmond or May. English Morello is very good for preserving. These two sorts are both hardy and profuse bearers. The Belle Magnifique ripens late and is desirable. The only drawback I find in raising cherries, is that birds are so numerous as to destroy large quantities. The only way I find to save the cherries is to shoot the birds as fast as they come. The cat bird, robin, brown thresher, and black and white red headed woodpecker are the most destructive. Gov. Wood cherry has fruited very well about every other year, ripening earlier than any other sort, and sweeter; the best variety I have: but it is not hardy enough to stand the severe changes of some of our winters without some shelter.

In preparing orchard ground, I prefer to have it planted in corn, or some other hoed crop, a few years previous to setting the trees, so it may be well subdued and friable. Before setting, it should be fresh plowed, and to save labor, plow in lands of the width the trees are to be set, having the dead furrow come where you want the tree. By plowing several times back and forth, in the dead furrow, it gets mellowed nearly deep enough. Stake off the ground, leaving a stake where every tree is to be set; then take a board, 6 inches wide, 6 feet long, with an inch and a half hole near each end. Exactly in the center, between the holes, bore, on one edge, a two-inch hole, and cut it out open on the edge; this is the guide to set the tree to Put the opening on the edge of the board against the stake where the tree is to stand, then have two pins or short stakes even thickness; put one in each hole at the end, and push them into the ground firmly. Lift up the board, lay it one side; then dig or make the hole for the tree where the stake stands, leaving the stakes at each end standing. When the hole is ready for the tree, place the board on the stakes, taking care that the edge that has the opening in it is the same way as before it was lifted up; then place the tree in the hole, and into the opening on the edge of the board, and it will stand exactly where wanted.

In setting trees, I have found by experience that it is best to set from 4 to 6 inches deeper than they stood in the nursery. They stand better, are not near so liable to lean over by high winds, and the roots are less liable to be drawn out of place. This, too, prevents sprouting at surface of the ground, where the graft unites with the stock or root. In a very dry season, it is more likely to insure life to the trees, as the roots are below ordinary dry spells. This applies more particularly to apple trees; other trees are not injured by it. Every one should exercise judgment; in wet, moist land it might be injurious, in fact such land is not suitable for any fruit trees. After an orchard is planted, it should be cultivated into some crop every year; I prefer corn, for the reason that it prevents weeds from growing in the latter part of the season, and is some protection to the young trees for a few years against summer winds. Always give four or five feet on all sides of the tree for light and air; and always cut and shock the corn, leaving the ground clear through the winter. This prevents, in a measure, the damage caused from rabbits and mice.

Never allow any brute in the orchard, until the trees are sufficiently grown to be in no danger of being rubbed over. Then nothing should run among them unless colts; they will do no harm to trees of bearing size.

Pruning should be attended to, so as to keep out all surplus sprouts and limbs that cross each other. Some varieties need much more pruning than others. Any man of common observatiou, can soon see what is needed. It is better to prune too little rather than too much; for oftentimes in the blossoming season we have high winds, that take off the blossoms before they become fructified; a tree with quite a thick top will escape, on the side from the wind, and be full of apples.

I have found from experience that, in order to have apples keep well, they must be carefully picked just before they begin to ripen. For instance, the Wagner, Greening, red seek-no-farther, Milam and other varieties, begin to drop quite early, particularly after frost, usually followed by wind. Those varieties I begin to gather in the latter half of September, and endeavor to gather all before they fail much. They can be put into barrels, headed up and kept in a cool place, away from the sun, or put into the fruit house. The cooler they can be kept, and not freeze, and as dry and not shrivel, the better.

So far as my experience goes, I am satisfied that, as a general rule, there can be the most realized by selling at gathering; then there is but one handling. By keeping through the winter, the extra labor, shrinkage, etc., will balance the extra price obtained in spring.

In packing for market, apples must be placed in the barrel carefully with the blossom end next the lower head, one course at a time; then the barrel filled carefully with good sound apples. Occasionally jolt the barrel back and forward lightly, to settle them tight, as the barrel is filled. When full, place the top layer all stem up, and have them as level as possible, and a little higher than the top of the chime; put on the head and press it down until it comes into its place. Start the hoops down, so as to hold it and take it out of the press, then finish driving the hoops, nail and head up secure. Packed in this way, they may be sent to a great distance without getting loose. In carting the barrels, they should always be loaded with the head up, the same as when filled, and never on sides of the barrel.

As to profit of an orchard, compared with other farm crops, I have no statistical data to refer to, but think it safe to say that, with judicious selection of varieties, the same amount of ground will produce four times as much clean profit in orchard as the same ground in any other crop, provided the ground be suitable for an orchard. But still I would not be understood to recommend or advise every one to go into fruit raising, no more than I would advise the exclusive cultivation of any one particular farm product, as that would prove ruinous, by glutting the market.

The apple tree borer is a great pest, and unless well looked after and cut out, will soon destroy an orchard, especially young ones.

The apple moth was very injurious last year, destroying nearly or quite one-half the crop of some varieties, by working into the apple through the blossom end and coming out near the stem, causing the fruit to fall from the size of a hickory nut until grown. The fruit was almost worthless until the apples were matured enough to be fit for making cider to work into vinegar. This worm, I had always been taught to believe, left the apple when it dropped to the ground, and burrowed in the ground through the winter; but from the great number that come out of the apples after being put in barrels, and wind themselves up in their web, under the hoops and in other places, *remaining until* very cold weather without any perceptible

change in form, leads me to believe they never winter under ground. How to prevent their ravages, is yet a mystery; no doubt by keeping the apples picked up as fast as they drop, and fed to swine or ground into pumace, would diminish them. I have thought sometimes of placing lights or lanterns in different places in the orchard, with a vessel of water directly under them, during nights in the summer. The light would attract the millers, they would flutter round, and finally fall into the water and drown. I expect to try this plan this season.

A. Rankin.—I consider the best varieties of summer apples to be the early harvest, red June, sweet June, summer queen, America, summer, Pearmain, sops of wine.

Fall apples—autumn, strawberry, fall wine, Fameuse.

Winter apples—Jonathan, yellow bellflower, Fulton, Rawle's Janet, and Northern spy.

The Newark pippin, white pippin, white pearmain, and some other varieties, also do well.

The ground should be trench plowed to prepare it for an orchard; plow very deep. The holes for the trees should not be any deeper than the ground was plowed. I set trees from 18 to 25 feet apart in the rows; prefer low heads. Prune to keep them open, so as to admit light, heat and air.

G. W. Minier—I really can't write an essay on this question. Fruits pay better than almost any other crop, are more healthy as food, and so easily produced that no one who owns a rood of land is excusable for not having them in abundance. Ground should be prepared by deep tillage, and all over the field alike; no holes or pits should be dug for water to stand in and keep their roots wet. Gather by careful picking with the hands; and for winter keeping, roll each in a paper like oranges are put up, and you will be well paid.

For insects, I refer you to Dr. Walsh.

J. R. Tull—My experience in the cultivation of fruit in this country reaches back about 25 years, during which time I have made it a specialty. I have found it a pleasant as well as a profitable business. I will give you a list of fruits which I consider the best, commencing with apples:

Summer apples: Early harvest, red June, red Astrachan, summer pearmain, summer queen, sweet June.

Fall apples: Drap d'or Dradar, fall pippin, fall wine, maiden's blush, porter, rambo, seek-no-farther.

Winter apples: American golden russet, Hubbardston nonesuch, Jonathan, ladies' sweeting, winter sweet, paradise, red Canada, Rawle's janet, Roman stem, New York pippin or Ben. Davis wine sap, white winter pearmain, Rome beauty, Roman sweet pippin, white bellflower, yellow bellflower.

Summer pears: Bartlett, bloodgood, Doyenne d' Ete, Osband's summer.

Autumn pears. Beurre Diel, Doyenne white, Duchesse d' Angouleme, Louise Bonne 'd Jersey, seckel, Stevens' Genesee.

Winter pears: Glout morceau, Vicar of Winkfield, winter Nelis.

Cherries: Heart cherries, black eagle, early white heart, Gov. Wood, yellow Spanish, Napoleon Bigarreau, white ox heart, duke cherries, early Richmond or pie cherry, early May, May duke.

Plums: Coe's golden drop, green gage, Jefferson, magnum bonum, Smith's Orleans, Washington, golden drop, Pond's seedling.

The above list of fruits does not embrace all the varieties worthy of cultivation; only those best in all respects for this locality. Nor will it hold good in other sections of the country, for I have found by experience that what is No. 1 in the east in quite a number of varieties, is very inferior here in the west, and some entirely worthless. And very many of these sorts are sent west by eastern nurserymen. The best locality for an orchard in this State, so far as my experience goes, is near the timber where the land is sufficiently rolling to drain itself, with a yellow porous clay subsoil; or if in the prairie, the dry rolling land should be selected. Trees on flat, hard prairie will not do well. The ground in which to set an orchard should be plowed deep and well pulverized, and from the time the trees are set out until they come into full bearing, they should be cultivated every year in some kind of a crop, such as beans, potatoes, pumpkins, corn or anything, so that the ground is well cultivated. But if, after setting out your trees, you sow the ground in oats and then seed down to timothy, you had better not purchase them, but give the amount which they would cost to some charitable object, and save your labor.

T. Gregg.—Our soil is peculiarly adapted to fruits—we think especially to apples and grapes—although all do well, excepting the tender sorts of stone fruits. For fruit planting, our soils should certainly be underdrained, or at least subsoiled. Most orchards are, however, planted without this necessary pre-requisite. Vineyards are mostly subsoiled or trenched.

The dozen varieties of apples I should select, from my own experience and that of my neighbors, as being most suited to this section, for their hardiness and productiveness, as well as for their market value, are as follows, viz:

Summer, 3.—Early harvest, red June, sweet June.

Autumn, 3.—Fall wine, rambo, maiden's blush.

Winter, 6.—Ben. Davis, wine sap, Rawles' Janet, Westfield seek-no-farther, Rome beauty, Hubbardston nonesuch.

To which add another dozen: Benoni, red Astrachan, golden sweeting, red bellflower, snow, fall pippin, Jonathan, Peck's pleasant, white winter pearmain, Ortley, ladies' sweeting, Pryor's red.

Several other sorts do well also in this vicinity, viz: American golden russet, Esopus Spitzenberg, Tallman sweeting, Stannard, Newtown pippin, Tulpehocken, Autumn, Swaar, Roman stem, Wagner, Dominie, etc.

In peaches—the best results are obtained from seedlings, most of the budded sorts failing badly of producing crops. There are some fine seedlings here, among which is one known as Felt's rareripe, which has been propagated for near thirty years from the seed. It is a fine yellow freestone, of large, but not largest size, and very productive. Much attention is lately being paid to the selection and propagation of best seedlings, and I am convinced that very fine peaches can be annually produced in this way.

The peach is short-lived; fifteen years being about the limit. This fruit is usually very much neglected; but with proper care and due attention to cutting back, doubtless five to ten years longer may be added to its life.

Pear culture is comparatively in its infancy—though it is believed that both standards and dwarfs will succeed; the former is most planted. Bartlett's and Seckel's as standards, and Bonne de Jersey and Duchesse d'Angouleme, as dwarfs, are the most popular varieties.

Many of the finer sorts of cherry have been planted here with poor success, so that few are now planted, excepting the old Morello and the early Richmond. The

English Morello is comparatively hardy, and will be planted as a late sort. The mooted question: whether the early Richmond is best on its own roots, or top worked on the Morello, will find no solution here—as both are doing remarkably well in certain instances.

The insect enemies of our orchards are chiefly the codling moth, borer, curculio, and peach grub. The first of these is becoming very destructive—infecting almost all the apple orchards in this region. The hog, sheep, chicken, ashes and lime, and soap-wash remedies, are all being tried with varied success. Against the other insect enemies a moderate share of vigilance is generally effectual.

Pear blight is frequent, both in the standard and dwarf, and so far our cultivators are at a loss for the cause or a remedy.

The leaf curl in the peach often occurs; but I have found little damage to result. Budded and seedling sorts are equally liable.

A. C. Hammond.—The following varieties of apples succeed well in this county, and give a succession from the 1st of July to the 1st of June:

Early harvest, red June, American summer pearmain, fall wine, maiden blush, rambo, Peck's pleasant, Rome beauty, Rawle's Janet, wine sap and Ben. Davis

These varieties are all productive, and are extensively grown for market. There are other varieties of better quality, but less productive, which every farmer should grow for his own use. Among them are the early Joe, Benoni, Fulton strawberry, Jonathan, King of Tompkins county, American golden russet, yellow bellflower, white winter pearmain and Newtown pippin.

Among pears, the Bartlett, Seckel, Duchess, Louise Bonne, white Doyenne, Beurre Diel, Flemish beauty, Lawrence and Vicar of Wakefield, are the most desirable. The blight is the only drawback to successful pear culture.

The early May is our only valuable market cherry. Some of the finer kinds are grown for family use, but the birds generally get most of the fruit. I prepare my ground for tree planting by trench-plowing, as heretofore described. Plant shallow and plow towards the trees for several years. I cultivate in corn seven or eight years, and then seed to meadow. It can scarcely be expected that the product of the orchard will ever be of any great value to the farmer as a market crop, as few can give their orchards the attention requisite to protect from diseases and insects that are so rapidly increasing.

H. Sodowsky.—For early fruit, I like best the early harvest and red June. For fall apples, would select the rambo, fall pippin, Baltimore sweet, sweet bough, maiden blush, Rome beauty, sweet bellflower. I think the Baltimore sweet the best. It is very large, with red streaks on yellow ground, and capital when fully ripe.

For winter apples, I would say the Thompson cooking, bellflower, white winter pearmain, black gilliflower, Hubbardson's nonesuch, Newtown pippin, Vandeveer pippin, northern spy, Pryor's red, Rhode Island greening, Esopus Spitzenburg.

Early pears: The Bartlett and Seckel. Fall pears: White Doyenne, Duchesse d' Angouleme, Flemish beauty, Louise Bonne d'Jersey, Swan's orange.

Winter pears: Buerre, Bachelier, Columbia, Doyenne, Joubert, Glout Morceau, Lawrence, Soldat, Vicar of Winkfield.

For cherries, would recommend the early May, May duke, black eagle, black heart, black Tartarian, Elton, early white heart, Governor Wood, great bigarreau, Belle de Choisey, early Richmond, English Morello, Kirtland's large Morello, Kirtland's mammoth.

The best peaches we have seen are: Stump the world, Heath, early Crawford, late old Mixon.

W. A. Allen.—Have preferred for winter varieties, bellflower, jeneting, pennock and English russet. Pruning time—whenever your saw or hatchet is sharpest.

S. P. Boardman.—All *reading* farmers who do not make the growing of fruits a specialty, go to the Transactions of our Illinois Horticultural Society for lists and varieties of the different fruits which are best adapted to their latitude and soil. In no other state in the Union, perhaps, does it make so much difference—from north to south, and on different soils—what selection of fruits is planted.

With our various live local horticultural societies, so ably seconding our State Society, few of our farmers, even those not professionally fruit growers, can miss it much in varieties of fruits, or their cultivation. I think, from making frequent visits to the eastern States, that Illinois farmers, generally, take a greater interest in, and are better informed on fruit matters generally, than the farmers of any eastern State. I account for it principally from the fact that nearly all of them have had to plant their own orchards.

B. Sweet.—A reformation in orchards and fruit growing is indispensable to success. As a fruit grower and reformer I exclude all but one variety of apple. What variety is that, for profit? The winter wine. The next best is a variety that bears a crop annually, is healthy, and does well either by neglect or care; for it is well known that orchards are usually much neglected.

We yet hope for some variety to take undisputed lead, and to that end every pomologist should direct his attention. Plant seed, and from the seedlings select the best; subjecting them to trial as soon as possible, by cutting out buds of seedlings in August or September, and inserting them in the center of bearing trees, where the sap can be driven against them for two years. At the end of this time, they should be bent down in a pendant form to stay the fast rush of sap which will throw it in a slow condition, and favor the formation of fruit buds.

Planting: This is of no little importance. To make a healthy orchard of any kind the trees should be selected when not over two years old; seeing to it that you get all the roots; then set out where the ground is in working order, cut back and crowd the culture of said trees. Keep the ground clean by raising a crop of vegetables, which pay their way and are a good substitute until you have fruit. In this way you reap the benefit of your labor, should your trees all be killed.

As to locality, the country is generally too flat; so let every one set on his highest ground; and if it is all low and wet, let him ditch and head up.

Pruning: Here volumes might be written, but let it suffice for me to say to the young orchardist, *don't prune.*

Fruit houses: The cheapest and best we have tried are made in this way: Wall two feet thick and filled in with forest leaves raked up in the fall; taking old leaves if necessary and tramping them. It is better to have box doors inside, filled with the same; the outside, common battening. It is all the better, if convenient, to have a long building, and doors at each end, to be opened if necessary. Potatoes are kept in this way better than any other; and both apples and potatoes, mixed with leaves and kept dry, are better.

G. W. Vaughan.—I have had but little experience in orchard fruits, but my neighbor, Mr. Freeland, has given his attention exclusively to fruit; and placing

great reliance upon his judgment, will present a list of the varieties which he recom mends.

Summer apples: Early harvest, Carolina red June, red Astrachan, Keswick Coddlin, yellow Horse and American Summer pearmain.

Fall apples: Lowell, fall pippin, rambo and maiden's blush.

Winter apples: Jonathan, Swaar, Domine, Milam, Waggoner and Janet.

Summer pears: Madeline, bloodgood, Lysan's, or Bartlett.

Fall pears: Stevens, Genesee, Flemish beauty, Louise Bonne d'Jersey.

Winter pears: Glout Morceau.

Peaches: Early York, large York, early Crawford, and Mixon free.

Cherries: Early May and Knight's early black.

The fruits here given are named in succession from the time they begin to ripen until winter, and after trying them one can hardly dispense with a single variety. The Milam, though classed with winter apples, is useful for all general purposes as a fall fruit also. I have a young orchard of small trees of various kinds of fruit, and I set them out in this way: I dug large holes 20 feet apart, placed a tree in a hole the same depth which it stood in the nursery, put in a lot of loose earth around the roots, then put in corn or oats to keep the roots and earth moist; then more earth, and when the hole was filled I put wet straw around the tree as a mulch. I find mulching excellent in preserving the life of the young tree, and believe that where it is adopted not one sound tree will die, be the season what it may. The corn or oats sprouting keep the ground moist about the roots, while the mulch keeps it moist above. I have set out trees four inches in diameter in this way, and they lived. I always mulch in setting out any kind of young trees. I think young fruit trees of any kind should be plowed and tilled like grain or root plants, if we desire a thrifty growth. I have tried the experiment on my young orchard. I had often heard that orchards should be sown in clover, and it would keep the ground moist and soft, and no plowing would be necessary.

I sowed it to clover, but afterwards made a part of it into a potato patch and plowed the trees with the potatoes, and those trees are three times as large as the ones not plowed. They are four years old. I am going to cultivate all this summer. I think trees should be pruned in the spring and before the limbs are large, as they heal more quickly, and before the sap rises much. Winter fruit should be gathered as late as is possible and escape being frosted, and kept in some place not too warm, until time to bury them for winter; then should be put in the cellar or buried in the ground by placing them in a box, and the box on pieces of timber, to keep them off the ground; then covered well with earth.

If the cellar is not too warm they might be put there when gathered. There are but few underground cellars here—indeed, few of any kind. They are being built above the ground, owing to the level nature of the country; building the walls very thick, and ventilating well for summer use. They are cool in summer, warm in winter, and are used for fruit houses in the latter season.

Various insects infest the apple tree, yet I can name but few. The caterpillar and a worm of much the same size, work on the leaves, and the latter strips the tree entirely before leaving. The former is not so destructive. Smaller worms, too, infest orchards, but not in this neighborhood. The borer is most destructive. It bores the limbs and lays its eggs, which hatch, producing worms by thousands. The limbs become scrubby and the tree looks almost dead. I know of no remedy for the borer.

D. Gove.—I have set out several orchards in the past 20 years, having been improving all the time. At first I took such varieties as nurserymen would recommend, but when they began to bear I found I had made a mistake. Latterly I have ascertained, from observation, the varieties that were good growers, good bearers, and of good quality, and that have given entire satisfaction in the vicinity where I was planting; as I find that soil, climate, and many other causes that make some varieties good in some places, will not prove good every where. In my present orchard I have early harvest, red June, summer pearmain, Pennsylvania red streak, rambo, Pryor's red, janet, yellow bellflower, wine sap, limber twig arge and small Romanite, that all do well. As to other fruits I have quite a variety, but as I think others can and will give better information in regard to their merits, I will confine myself to such matters as I think may be of service.

J. G. Swann.—Best varieties winter apples: Janeting, sops of wine, Romanites, Newtown pippin.

Best summer varieties: Early harvest, Carolina June, summer queen.

Best fall varieties: Rambo, Pennsylvania red streak.

Pears: Bartlett, Belle Lucrative, L. B. Jersey, Vicar of Winkfield, Seckel. All do well sowed in clover.

Peaches: Seven to eight leading budded varieties, not old enough to bear well yet.

Cherries: Morellos bears well.

Prune when sap is down any time. Gather in baskets, handling carefully. Pack in barrels. Preserve by pressing the best and putting the others in cellars and bins. Value of my orchard crop this year, $2,500.

Borers: Knife the best remedy.

My orchard consists of the following number of trees: Janets, 2,000; Romanites, 1,100; N. pippin, 500; summer fruit, 500; wine saps, 200; rambo, 75; red streak, 50; bellflower, 200; large red, 50; other kinds, 200. All the above fruit from 5 to 15 years old. 100 pear trees 7 years old. 500 budded peach; 1,000 seedling peach. 50 gooseberries. 75 grapes. 50 cherries.

E. A. Reihl.—Apples: sorts preferred, the very early and winter most profitable. Prefer early harvest, red June, red Astrachan, Hubbardson, Rome beauty, wine sap, Gilpin, Janet.

Grapes: Concord and Norton's Virginia, so far the most reliable and profitable.

Blackberries: Kittatinny considered best; strong grower, hardy, and much better quality than the Lawton.

Strawberries: Wilson's Albany is the best for market.

J. Balsiger.—Apples do very well here, and the orchard bears more or less every year. Those kinds which are very productive, such as Rawle's Janet, the little Romanite, the white and red June, the rambo, and others, bring full crops only once in two years. The kinds which my experience shows me to be the most profitable are the above named, and the white winter pearmain, the American golden russet, Esopus Spitzenburgh, the Pennsylvania red streak and the yellow bellflower. No doubt there are others as valuable, in which I have had no experience. I have a nice orchard and a fine selection of apples, but most of my trees are yet too young to bear. As far as I know, the wine sap and Pryor's red must be among the best apples for our latitude, but they have not yet fruited with me. For cider, I am planting Hewes' Virginia crab, Harrison and Campfield.

Pears seem to do very well with me. The trees are healthy and vigorous, but as yet I have very few *of them in bearing,* and possess but little experience co-

ing them. Of those I know I like the Bartlett best. My peach trees bring me regularly a good crop every two years; when they do not bear it is because the winter's cold has killed the fruit buds, of which they are full every year. Peach trees demand a high and dry location; the higher the better, so has experience taught me. I first planted my peach orchard on the hillside, but not on the highest place of my farm, though only a few feet below it, and it never brought any fruit, so that I had to dig up the trees again. I then planted other trees on the top of the hill, which is but little above the general level of Looking-glass prairie, and there they bear now once every two years regularly.

I have seen in my neighborhood that on the highest places along Silver creek peaches bring the most regular crops. I am not experienced enough to make out a list of the best kinds for our region, though my trees are all budded and raised by myself.

Of cherries, I have only the acid kinds, the Morellos and Lowell. I tried the Bigarreaus also, but without success; they are too tender. I think the early May or early Richmond to be the most advantageous. I am trying the Duke also.

For orchards it is necessary to choose a dry location, or else drain it by under, or at least by surface, drains. The land must be plowed very deep, the deeper the better, and subsoiled if possible.

Apple and peach orchards need to be cultivated at least till the trees bear well. Till then I had my orchard planted every year in corn, potatoes or other hoed crops. When the trees are growing large it is rather difficult to plow and cultivate the land, for the roots are broken by the plow; and as the trees ought to be grown with very low heads, there will soon be too little room left for plowing. I am planting apple trees at a distance of 25 to 30 feet, according to the kinds and the habits of the trees. Peach trees I plant from 16 to 20 feet apart.

When I cease cultivating the land I sow it in clover. I have never seen that the trees suffer by it. They will perhaps not grow so vigorously as when they were younger, but they become more productive. The clover I cut for soiling cattle and hogs, and also for hay. Cherries and pears I plant in the sod, in clover and timothy, making large sized holes for them before planting; they grow vigorously enough without cultivating the land. Only while they are yet small I keep a little space around the trunks and above the roots clean by the hoe, and mulch them with straw or chip manure, or any such material.

We gather our winter apples in dry weather, and put them in a dry and cool cellar on shelves, where they keep very well. We have often kept some till the following summer, when the earliest summer apples commenced ripening. The little Romanite we find the best keeper. Sometimes when the weather is favorable, we leave them for several days in heaps under the trees, for sweating, before putting them in the cellar. This is a good method.

My fruit trees do not often suffer from disease. Sometimes the borer will attack those which are not vigorous, but I cut him out and cover the wound with grafting wax, and commonly save the tree in this way. Last season the apples were much attacked by the codling moth, and the great drouth in connection, caused many to fall off before ripe.

To prevent this in future, as much as possible, we shall have to gather up the fallen fruit every day and feed it to the hogs, or when ripe enough make cider vinegar of it. The green pippin, and most all other pippins I am acquainted with, rot *badly on the tree,* stung or not; of the former there were hardly any sound ones left *to be gathered.*

T. Engelmann.—The attention of the farmer being directed exclusively to the raising of wheat, little care only is bestowed upon orchards, although apples and peaches succeed to great perfection. Large numbers of trees have been planted of late years, but most of them have failed to grow or have been destroyed again by cattle or on account of neglect. Some old orchards in the neighborhood bring almost yearly good crops of apples, mostly seedlings or of inferior quality, which are turned into cider. To the Gilpin (little Romanite) and the Janeting preference is given for that purpose.

My own orchard covers seven acres of ground on the northern slope of the hill. It was planted in 1850, partly in 1859, with select varieties of apples, some pear and some peach trees. The apple orchard brings full crops of fruit only every alternate year. Without a market of easy access and without railroad connection, summer and early fall apples are of but little value. The late fall and winter apples sell readily for cider-making.

Pear trees do not succeed with me; most of them are already dead, and those that remain have all exhibited signs of disease.

Peaches succeed to great perfection, equally well on the northern as on the southern slope of the hill.

The borer has made its appearance within the last four or five years, and is very destructive to young trees. Wood ashes, which I have applied, appear to delay, but not to cure, its destructive work.

G. C. Eisenmeyer.—Apples, pears, peaches, cherries, etc: The cultivation of these fruits is only to be recommended for family use; the land being better adapted to cereals than to fruit. Of apples, the little Romanite, Pennsylvania red streak, limber twig, big hill and Shiloh pippin, are the best and most profitable varieties. The ground should be plowed 15 inches deep before planting, and trees set on the ridges 20 or 40 feet apart. If they are planted 20 feet apart they will have to be thinned out when they become too thick. They should be planted as shallow as possible and pruned very low. The stem should not be more than 3 to 4 feet high. The old practice of deep planting and long or high stem pruning, is now considered, and really known, to be destructive to successful fruit culture. A great many orchards are ruined by cultivating small grain, such as wheat, oats and barley, which is very ruinous to an orchard; hoe crops and corn are the only things that should be planted among trees for at least the first 5 or 6 years; afterwards you may sow it down in clover for a few years.

The best insect destroyers are a number of hogs turned in your orchard as soon as the trees are large enough to admit of it without injury to the trees.

J. Barber.—Of the summer apples which have succeeded best with me, are the red Astracan, red and yellow June, and summer queen.

Fall varieties are principally Rambo and bellflower.

Winter varieties—wine sap, limber twig, Janeting, Ben Davis, Milam, Rhenish May, etc.

Pears have not succeeded on my high land, on account of the blight, but, near me others have succeeded in obtaining a few good good crops on heavy clay subsoil.

The peach is my principal market fruit, and I have more of these than all others put together. The varieties which have proved successful are the Troth's early, early Crawford, royal Kensington, large early York, yellow rareripe, late Crawford, old Mixon, smock free, and heath cling. Serrate early York is one of the earliest, but it rots so badly *on the tree just at ripening*, more especially on old trees, th

it is not worth cultivating. I begin to market the Troth's early and early Crawford, about the 25th of July, closing with the heath cling, near the latter part of September. The three best varieties for market purposes, in the above list, I consider to be the early and late Crawford and heath cling. The best flavored are the royal Kensington, large early York and old Mixon.

I have had quite a number of varieties of the fine (?) cherries, but some of the trees are very tender, and are easily winter-killed, and most of the others which have lived through long enough to bear, rot their fruit at or near ripening. The only variety which has succeeded well is the early Richmond or May.

My ground is prepared for orchards by deep trench plowing and thoroughly pulverizing. Apple trees were planted 40 feet each way (too wide by 7 feet), and alternated with peach, making 20 feet from tree to tree. The peach trees die out by the time the apple trees are large enough to fill the space. Early spring is the best time for planting; if done in the fall, the trees are liable to be lifted by the frost during winter. The orchards are usually cultivated with corn the first two or three years. After the peach trees come into bearing, the only cultivation is by shallow plowing and harrowing twice each season.

The apple trees are pruned mostly in fall and early winter, by thinning out. Shortening in the branches is done in the latter part of July, in order to develop fruit buds. Peach trees are shortened in early September.

Winter apples are gathered just before cold weather, and kept in shallow bins or drawers in a dry cellar. Packing for market is done in barrels, excepting the very earliest, which are often packed in boxes similar to but larger than peach boxes. Peaches are laid in regular tiers in boxes made of slats. Size of box, in inches, 5x8x22. Cherries are sent to market in shallow berry drawers.

The caterpillar and apple tree borer are the greatest insect enemies to the apple tree. Rabbits are also very destructive, girdling whole orchards in the winter, when not protected. I have used soft soap as a preventive. This is also greatly beneficial in destroying larvæ of insects, and gives the bark a healthy and beautifully smooth appearance throughout the succeeding summer. It is not always infallible against the rabbits. Branches of late fall and winter pruning are left beneath the trees, thereby bribing these destructive pests against depredations upon the trunks.

The borer is the greatest enemy to the peach tree. They are cut out with the knife in the spring. There are some few curculio which attack the fruit. They are partially destroyed by turning hogs in the orchards, which eat the fallen fruit, and thereby preventing their propagation.

As to value of orchard products, I cannot give precisely the amount. Sometimes more and sometimes less, according to season, market prices, etc. It is unquestionably greater than grain crops. On one peach tree alone, of Heath cling, I realized $30. This is an exception, not a rule.

J. Warder.—The cherry has not done well with us, but perhaps we have an indifferent variety. The quince grows here of superior size, also the damson plum. Our best apples for winter are the Spitzenberg and Pryor's red.

Our main fruit is the peach, but the rough roads and distance to market are discouraging. We dry most of the crop.

My plan of a dry house is cheap and may suit persons of small means. It is built of hewed logs, 12 feet square and 7 feet high, the cracks well pointed with lime and sand. Tight floor laid over head, dirt floor below. Stove standing near the center, *with door opening* towards the door of the dry house, so that wood can be put in

conveniently. The fruit is put on movable shelves, from 4 to 6 feet long, 18 or 20 inches wide, with strips on the bottom, 1¼ inches wide and ½ of an inch apart; these are arranged all around the house on bearers, about 6 inches between them, and may be taken out to a shed to be filled with fruit and replaced in the dry house at pleasure. Moderate attention to the fire will dry them to a nice brown in twelve hours or less time. Peaches dried with the skin on should be placed skin downward; they will dry quicker and nicer. Apples and other fruits may be dried in the same manner.

13. SMALL FRUITS.—Grapes, currants, gooseberries, blackberries, raspberries, strawberries: varieties preferred: mode of preparing ground: planting, cultivation, pruning, draining and gathering; value as a farm crop: insects and diseases.

E. Moss.—Grapes, currants, gooseberries, blackberries and Wilson's strawberries all do quite well

M. A. McConnell.—Grapes and currants can be cultivated very successfully. Blackberries, raspberries and strawberries can be grown very profitably in this climate.

H. Pierce.—Concord, Delaware and Hartford prolific are our best grapes. Red Dutch currant and Houghton seedling gooseberry. No blackberries have been tried here, since the Lawton has failed, long enough to speak with certainty. I have a few mammoth Missouri that are all right yet, and they are exposed to the winter. Doolittle's black cap is the best raspberry. Wilson's Albany strawberry for market, and Smith's buffalo and triomphe de gand for table.

J. Tefft.—Isabella, Clinton, Diana, Hartford prolific, Concord and Catawba are the grapes now under cultivation. The Catawba does not amount to much in this section, and the others need to be covered in winter. Prune any time after first of November to first of March. Currants—white and red and English black. Gooseberries—Houghton's seedling is the variety most in use. Raspberries—a black cap, called by some, Blue Antwerp. These are hardy and produce well. Strawberries—the variety most in use is Wilson's seedling, which succeeds well.

A. Rankin.—Have a number of varieties of grapes; but the Concord is the grape for everybody. However, the Hartford prolific, Delaware and Clinton do finely, and a great many others do well some seasons. Have a number of varieties not fruited yet.

Have the common red currant and the Houghton gooseberry. Both do well and are profitable with very little cultivation and care.

Have several varieties of raspberries. Doolittle's black cap is the best, and is very profitable.

I have a large variety of strawberries. Consider the Wilson the best market berry; but the Jenny Lind, early scarlet, Shaker's, Triomphe de Gand, and some others are good for the table. Do not think strawberries a paying crop for farmers, except for their own use.

In cultivating and pruning grapes I do not believe any general rules can be adopted; for, while some require high manuring and cultivation, others need the poorest ground to check an overgrowth of unripe wood, mildew, etc. Some bear pruning vere much, others not at all. Some varieties do well in some localities and not in others. I think, too, the soil and locality have their effect on the grapes, as to ripening and so on. The seasons also have their effect, some years one kind will ripen first, the next *year some other kind.* The same, also, can be said of the—

diseases. A man should buy the kinds that generally do the best, and get instructions about planting and pruning from some nurseryman, and notice the effect. At the same time he should exercise his own judgment. All, or nearly all the ground for fruit of any kind should be thoroughly under-drained, as stagnant water soon rots the root.

J. R. Tull.—There is a great deal said about grapes and grape culture within the last few years, and of the great profit atending it, as well as of the great number of new varieties claiming superiority. But it isfound some, at least, of the varieties for whom such high merit was claimed, prove for most purposes entirely worthless, while the older sorts are the ones to rely upon. My experience is that the Concord is the best grape, for all purposes, that is cultivated. But for profit, the currant is in advance of the grape. As much wine can be made from an acre of currants, taking one year with another, as from an acre of grapes, and with half the labor. Here, the best article of currant wine is worth $4 per gallon, while the grape is only worth $2. The currant is much the surest crop. It scarcely ever fails, and is not subject to disease like the grape, and its merits only need to be known to be appreciated.

T. Gregg.—Grapes: for market—Delaware, Concord, Hartford prolific and Catawba. For wine—Delaware, Concord, Catawba, Clinton, Norton's Virginia and Ives' seedling have the preference. But a number of other sorts—as Iona, Isabella, Anna, Diana, Rebecca, Cynthiana, Crevelling and several of Roger's hybrids—have been tried with varied success, and many others are now on trial.

Currants—red and white Dutch predominate; cherry has also been planted; black Naples is hardy, prolific and valuable.

Gooseberries—Houghton seedling and American seedling; the former mostly planted.

Blackberries—Lawton does well with proper care.

Raspberries—Doolittle and an ever-bearing black cap (name not known) are much esteemed. All of the suckering varieties are generally discarded.

Strawberries—their name is legion; Wilson is most relied on. I have had good returns from McAvoy's superior, Longworth's prolific and necked pine. Have Triomphe, Agriculturist, and a dozen of the newer sorts on trial.

A. C. Hammond.—The Catawba, Concord, Hartford prolific, Delaware, Creveling, Clinton, Norton's Virginia and Ives' seedling are our popular grapes. The white grape, red Dutch and cherry currant, and Houghton gooseberry are most valuable. The Lawton blackberry is losing its popularity, and will probably be superseded by some of the new varieties. Among raspberries, the Doolittle, and among strawberries, the Wilson take precedence. As a farm crop they are not valuable, on account of the attention required in cultivating and training; yet every farmer should have his fruit garden, from which to draw daily supplies for his own table.

H. Sodowsky.—About 19 years since I first gave attention to small fruits. I think the Catawba and Isabella are not grapes for this climate, they are too often killed by hard freezing. The Concord is very hardy and will hang on the stakes or trellis all winter, so will the Clinton, and both bear well. The Delaware is a very sweet, small grape. I have 8 or 10 varieties, but think the Concord and Clinton are the grapes for this climate.

In currants, I have the white, cherry, purple and red Dutch, but think the white the finest and sweetest I ever saw. The cherry is a fine large currant, but not so good a bearer as the red Dutch.

Among gooseberries, I can recommend the American and Houghton's seedling as the best bearers. They are free from mildew and blight, to which the white Smith, though a fine, large berry, is liable.

I suppose, from the best information, that the Missouri mammoth is the best blackberry.

The best raspberry I have tried is the perpetual. It is a large black berry, resembling the common wild raspberry in flavor.

As to strawberries, I find little difference between three varieties. Wilson's seedlings, triomphe de gand, and a variety received from Horace Greeley, but whose name I have forgotten.

G. W. Vaughan.—Grapes are not extensively cultivated here. The Concord, Isabella, Catawba and large English are among the best. Gooseberries, blackberries, raspberries, strawberries and currants are more cultivated. The English gooseberry, Lawton blackberry and Wilson strawberry are among the best.

J. G. Swann.—Gooseberries and currants—common kind. Produce well.

J. Balsiger.—Small fruits I have not yet planted largely, only for family use. They generally do very well with me. Grape vines grow vigorously. Catawba and Isabella rotting badly every season, but Hartford prolific, Concord, Delaware and Norton's Virginia doing well, as far as I can judge. I am trying other kinds, but cannot yet report about them.

Currants bring abundant crops every year, at least the red Dutch. I have commenced trying some new kinds also.

The Houghton seedling gooseberry, the only one I have cultivated with success, bears abundantly. The quality is not very high, but it is good for pies, hardy and healthy. Tried English kinds, but they never bore a single fruit, and died, killed by mildew.

I have planted the Lawton or New Rochelle blackberry; it promises well.

Of raspberries, I have the Kirtland, the Philadelphia and the Brinkle's orange, in bearing, and I am well satisfied with them; they, except the Brinkle, which needs covering in winter, being hardy, of good quality and productive. An objection to the Kirtland might be, that it suckers very much. I have also the Doolittle on trial.

Of strawberries, we planted the Wilson, the agriculturist and the triomphe de gand, all of good quality and productive, but the Wilson dying out after every full crop. All have suffered badly from the drought last summer.

All these small fruits prosper best if planted in deeply worked and rich land. For grapes I prepare the soil by several plowings from 15 to 18 inches deep, and manure, when not rich enough, with ashes, rotten sods, bones, leaf mould and such like. For the other fruits of this class, I dig trenches, 2 or 3 feet wide and 2 spades deep, and mix the earth, when throwing it in again, well with rotten manure, and set the young plants in this enriched soil, at a distance of 4 to 5 feet. The rows of small fruit are in my peach orchard, at about 10 feet from the trees, alternating with the rows of peach trees. They ought to be kept clean of weeds. Blackberries and raspberries pinched in in summer, the old wood after bearing, and the superfluous shoots cut off, leaving only 3 or 4 of the strongest stalks. Currants and gooseberries ought also to be thinned, and the old wood of more than three years of age retrenched. I surface manure the plants nearly every fall or winter abundantly. They did not suffer perceptibly from any disease or from insects, excepting the rot in the Catawba and Isabella grapes. Some grape berries have been stung by some

kind of curculio, who laid his eggs in them, which produced a worm that spoiled fruit. There were some leaf rollers on my grape vines which I destroyed; the much dreaded thrips I have not yet observed. I have found, but rarely, the spot pelidnota on the vines, but it had not injured them perceptibly. The currant lea were attacked on the under side by a kind of black or gray aphis, which cau them to curl up more or less.

T. Engelmann.—I have 14 acres in grape vines, nine of them already in bear I selected the land of my farm with reference to raising grapes and making w The hill sites were covered with wild grapes, which fact seemed to encourage en prise and promise success. In 1851 I had one acre of ground, with a south aspect, trenched with the spade two feet deep, at a cost of $130, and planted Catawba vines 5 to 6 feet distant. The Catawba was at that time the only g known or recommended as a wine grape. I enlarged my vineyard every year u in 1857 it embraced six acres. The rows ran east and west, and the vines trained to stakes. The results of the first few years after the vines came in bea more than realized my most sanguine expectations; the vines were thrifty healthy, and the fruit, and the wine made from it, satisfactory in quantity and s rior in quality, and found a ready sale to the wholesale wine merchant at $3 gallon. If we bear in mind that at that time wheat was $1 per bushel, wages f $8 to $12 a month, and other commodities or necessaries of life in proportion, can form a correct estimate of the profits realized from my vineyard. In 1858 diseases to which the grape vines are liable, made their appearance and were destructive, and remained so until 1865 unabated. In 1865 about half a cro good grapes was obtained; the vintage of 1866 was still better, and that of 1 was superior in quantity and quality. I obtained from my six acres of Cata vineyard 1500 gallons select quality of wine, and 1200 gallons by the second p ing, of very good quality. In 1864 I had changed the rows in my vineyard f east and west to north and south, and I do not know whether the better crops tained in the three next following years is owing to this change or to unkn atmospheric influences.

In the meantime the market has also experienced a change. It is flooded imported and imitation wines, and native wines are not in demand. My vintage 1866 and 1867 remain unsold in my cellar, although I offer them freely at $1 5 $2 per gallon. If we take in consideration that wheat at present is $2 50 a bus wages, exclusive of board, from $20 to $40 a month, and almost all other comm ties in proportion, we can make a correct estimate of the reduction in the pric wine.

My best vintages were in 1857 and 1867. They averaged 450 gallons to the a The average yield during the thirteen years that my vineyard has been in bearin not more than 110 gallons per acre; which, at $1 75 per gallon, would make $19 gross proceeds per acre.

The cost of production, according to present rates, would sum up as follows:

Interest on value of land, $100 per acre	$10 00
Interest on preparing land, (trenching) $130	13 00
Vines and planting and cultivating first year, $200	20 00
Stakes and trellises, $150	15 00
Stakes and trellises, repairs for year	10 00
Three years' labor until bearing, $50 per year	15 00
Labor for year, (wages)	100 00
	$183 00

This estimate, however, I do not consider as reliable. Its fallacy will be detected in the many failures which I have experienced, and which I hope shall in future be avoided. The grape diseases may disappear, or we may find a remedy or preventive for them; or we will plant varieties less subject to them than the Catawba, and in this way secure more regular and remunerating crops. The price of wine may also come up again to a higher figure in consequence of failures in the wine-growing countries of Europe, or in consequence of the imposition of a higher tariff, or increased costs of importation.

Of the many other varieties of grapes which of late years have been recommended for general cultivation, a few only have been extensively planted: The Norton, the Concord, Herbemont, and Clinton. Of these I consider the Norton as the most valuable; it is nearly free from disease, and its wine is of superior quality. It is a good bearer, yet the berries being small and not very juicy, 200 gallons per acre may be considered a very good yield; it is the largest yield which I have obtained from this grape. The Concord is not so healthy as the Norton, yet it soon recovers from the effects of the diseases, and ripens an abundant crop of large and showy fruit to perfection. It is very productive, and will make between 600 and 800 gallons of wine per acre. The wine is, however, of inferior quality, and the grape will soon be discarded in the list of wine grapes, while it may continue to be valued as a dessert or market grape. The Herbemont is, in my estimation, as a wine and dessert grape, superior to all others; but it is tender, requiring protection in winter, and is liable to disease, especially to mildew, and I am doubtful if extensive planting of this delicious fruit would be profitable. The Clinton, generally considered the healthiest of all grape vines, will not succeed here. Either the soil, the situation, or the local atmosphere, do not agree with it. In three successive seasons it has dropped its leaves prematurely, and ripened its fruit but imperfectly.

G. C. Eisenmeyer.—The Concord, Norton, Virginia seedling, Herbemont, Hartford prolific, and Clinton grapes are the only valuable varieties successfully cultivated. The *modus operandi* of planting and pruning is described in too many books and papers to admit of a description here. However, I will say that I plow about 15 to 18 inches deep, with a plow constructed for that purpose; plant in the fall if possible, 6 to 8 feet apart; use a small stake the first and second years to tie the young vines to; after that set posts in the ground 20 feet apart, and then stretch No. 10 or 11 wire 18 to 20 inches apart along said posts, to which two vines are tied, partly perpendicular and partly bowed, as the canes may be long or short. Pruning should be commenced as soon as the leaves drop off the vines in the fall, and continued through the winter and spring till completed.

J. Barber.—Of grapes, I find the Concord to be the best, so far as my experience has gone. The yield is enormous, and it is less liable to disease. The Catawba is good, but it rots badly. Hartford prolific and Delaware not yet in bearing. Concord and Hartford prolific are planted in rows six feet apart, and eight feet in the row. Pruning is done in fall and early winter, in order to save the wood for cuttings.

Currants: Mostly red Dutch. Gooseberries: Houghton's seedling. Currants have not yielded very heavy crops, but the gooseberries bear enormously. They are planted in rows four feet each way. Have not cultivated blackberries. Wild ones are numerous, of which I have marketed several hundred bushels, realizing remunerative prices. Have several varieties of strawberries. As yet the Wilson is the most profitable for market. *Jucunda or Knox's*, 700 fruited with me last year (1867)

and is very promising. For all the small fruits I trench plow deeply and set in spring. Marketing is mostly done in shallow drawers, holding a half bushel.

J. Warder.—The small fruits flourish well with us—the strawberry in particular. We have two varieties, the Albany and neck pine. The latter reqaires less sugar, and will bear neglect better than any variety we have tried. Have tried the Isabella and Catawba grapes; the Catawba is too apt to rot.

14. Woodlands and Timber Plantations.—Experience in forestry: in management of woodlands, or in growing timber trees from seeds or young trees: value as a crop and as shelter for crops and animals?

E. Moss.—By keeping out fires our woodlands seem to extend. The soft maple is planted in groves, somewhat, to good acceptance.

M. A. McConnell—Woodlands can be grown, and almost all kinds of timber, with care, and are very necessary for the protection of animals.

D. C. Scofield.—Woodlands: 1st. By woodlands, I mean all lands which have on them a growth of natural forest, either large or small; and I will embrace in this definition all lands from which the timber has been cut and taken away, and has not been subjected to the "grubbing and annihilating process."

2d. Certain varieties of timber when cut away have a tendency to sprout and reproduce another forest. Such is especially the tendency of the oak and hickory, of which our prairie groves and forests are composed. A second forest may be secured, of great profit to the owner and the country, by fencing immediately on the removal of the timber, and protecting from cattle and fires a few years; when, without further care or expense, a valuable crop of young timber is the result. A considerable portion of the eastern States are supplied with fuel and timber from forests of second growth, and already thousands of cords of wood which have grown within the last thirty years in our prairie groves, are sold in our markets.

3d. These timber lands should be perpetuated. Inducemets should be extended in the form of exemption from taxation, or some other way, to all who will thus protect and perpetuate timber land.

Timber plantations: By this we understand, timber planted and cultivated as any other farm crop. That this may be done with great success and profit is already demonstrated in Europe, and to some extent in America.

The pine and the larch, it is said, grow equally well on poor and rich soils. My experience is on rich prairie soil. In 1856 I broke new prairie, and in 1857–8 imported from European nurseries and set on the now well subdued grounds several varieties of tree plants. The evergreens consisted of Weymouth (or white) Scotch and black Austrian pines, Norway spruce and European silver fir. The deciduous trees were European mountain ash, *Tyrolese larch, and Scotch elm. About the same time I planted seeds of American white ash, white and red elm, silver or soft maple, black walnut, rock or sugar maple, and horse chestnut. The two latter grow exceedingly slow from seed on prairie soil, and should be planted on timber land in a high state of cultivation.

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* There are two varieties of Larch cultivated in European nurseries: one known as "Tyrolese," which was introduced into Scotland in the year 1738, and was found in the Tyrolese Mountains, a portion of the Alps. It is upright and beautifully symmetrical in its form, while that known as "European" is wild and irregular in its habit, resembling the American Larch (or Tamarack), a native of some of our swamps.

I also imported from American forests the American balsam and arber vitæ. The European silver fir was too tender for the climate and proved nearly a total failure. All the rest have proved to be hardy here, and have made satisfactory growth. The larch, black walnut, silver maple, American white ash, Weymouth, Scotch and black Austrian pines, and Norway spruce, I planted in forest belts, and all have made satisfactory growth, except where the black walnut was planted among other trees. It should be planted in separate plantations.

Since the importations and planting of 1857–8, I have imported for trial, the Cembra (or Swiss Stone) Pine Corsican, Maratime, Mountain and Mungho Pines, none of which do I regard as valuable for forest culture, but only for ornamental plantations. Any of the American varieties of deciduous trees that I have mentioned, may be raised from the seed by the farmer, as readily as corn; but the larch and evergreen varieties require skill, which but few possess, to raise them from the seed in this climate, and then only on light, sandy soils, and partially shaded during the first year. The Tyrolese larch may be successfully transplanted from the seed-bed at two years old, into nursery rows, and should remain there under good culture two years, when it is suitable for the forest plantation. There they should be set three feet apart each way, in rows, and in five or six years one-half should be taken out for hop poles, grape stakes or trellises, etc. In twelve years one-half the residue may be taken for fence posts, leaving the rest to grow six feet apart. At twenty years old, one-half the balance may be taken for railroad ties, fence posts, and spars, leaving 605 trees to the acre, to grow on ten years more, or until the plantation is thirty years old. Then one-half of the balance is removed, leaving 302 trees per acre, many of which will be two feet in diameter and sixty feet in height.

This is the method of forest culture in Europe, which I learned from a private correspondence with one of the most intelligent nurserymen and foresters in Scotland. He also adds his testimony in reference to the strength and durability of the larch. He says it is the most durable timber in Europe, exceeding that of the red cedar, and has the greatest elastic strength of any known timber.

The Weymouth or White Pine, which exceeds in value all the known varieties of pine, for both civil and naval architecture, stands foremost in value of all the evergreen tribe, and is not excelled by any in beauty or rapid growth. It is among evergreens what the larch is among deciduous trees. These two varieties of timber compare, in commercial value, for forest culture in this country, above all other varieties, as five to one, and should be planted by acres on every farm, not only in the prairie, but in all the States of the Union. Both the Tyrolese larch and Weymouth pine will acquire a diameter of from two to three feet, and a height of from sixty to eighty feet in less than fifty years. The pine is not valuable until large enough for sawing timber, while the larch is valuable as soon as large enough for hop poles. It is asserted, on high authority, that small poles of the larch have stood for hops and grapes several generations, and yet show no signs of decay.

Pines should be set in the forest plantation twelve feet apart, and the rows filled up between, at three feet apart, with larch. These should be successively removed, as when the whole plantation is of larch, until the pine alone is left. It is necessary, in order to secure the most perfect forest, to follow as nearly as possible, nature's method, by planting closely, which tends to send the growth upward and divest the trunk of limbs.

Many of my larch and pine trees have grown only ten years from tiny plants, and now measure more than 20 feet in height, and more than two feet in circumference near the collar or base. Many of the larch will now make three fence posts each.

Forest tree plants: Although some planters in this country have succeeded in producing evergreen and larch plants from seed, yet it has been at such cost that I regard the European plants as cheapest, as the climate is such that they grow there about as readily as spires of timothy do here. Then, as labor is so much cheaper there than in this country, it gives the advantage to the European planter. The plants should be transplanted one year before they are imported, when they acquire a good stock of roots, and can be imported then, with safety, to this country.

Profits: The value of such forests can scarcely be computed. If half their value should be estimated and exhibited in figures, it would awaken skepticism. A plantation of a few acres for shelter for stock and crops, alone would abundantly pay any farmer for all the expenditure. The progressive and ultimate value of an acre of larch and pine, at the end of seventy five or eighty years, is no less than ten thousand dollars. The excess of larch timber from one acre alone, in thirty years, leaving on the ground 302 trees to grow to an ultimate forest, exceeds four thousand dollars. At the age of seventy-five years, each of the 302 remaining trees on the acre, whether of larch or pine, will exceed one hundred feet in height, and average more than three feet in diameter, and are worth in the aggregate more than six thousand dollars. To encourage the cultivation of forests State and National patronage should be secured by offering liberal premiums per acre for forests, planted and cared for, from a half acre to one hundred acres; also exemption from taxation for twenty years from planting. All county Agricultural organizations should offer liberal premiums for the best forest plantations.

J. Tefft.—I have about six acres in an artificial grove, mostly maples. They grow finely and look beautifully; but I cannot say that it will ever be of any value, except for sheltering stock. I should not want a field crop sheltered in that way. It might do for cucumbers, and perhaps blackberries.

O. E. Barney.—The white willow makes a good wind-break. Do not let any willow find out where your wells and cisterns are. I lost one of each by that means.

G. W. Minier.—The American people are bringing ruin upon their country by their wanton waste of timber. The people of Illinois, especially, owe it to themselves to foster natural groves and plant artificial ones. I wrote an essay on "The Cultivation of Forest Trees," for the State Agricultural Society, which the Secretary, Mr. Reynolds, writes me is now being published in the Transactions. Mr. Samuel Edwards also wrote one, which will likewise be published in the Transactions. For mature views you are respectfully referred. I also had the honor to offer before the "Northern Illinois Horticultural Society," at its first meeting in Freeport, on the 13th instant, two resolutions on this subject, which passed unanimously, and to which I would direct your especial attention.

J. R. Tull.—The growing of timber is greatly neglected in this State. Every man that has a quarter section of land in the prairie should put out 20 or 30 acres of it in some good, thrifty, growing timber, such as black walnut, soft and sugar maple, but never black locust. Soft maple is the easiest timber raised, and is of very rapid growth on our prairies. I have raised it 3 to 4 feet high from seed, of *the same year's* growth. The seed ripens the last of May, and can be gathered and

planted at once, and will come up nearly as quick as corn; and, if well cultivated, will obtain by fall a growth of from two to four feet. The ground should be put in good order before planting the seed. Sugar maple may be raised in the same way, but the seed is later in ripening, and the plants will make but little growth the first year. Black walnut may be raised by planting the walnuts in the fall and covering with chip manure, so that the ground may not bake when it drys off in the spring. But I would recommend to all who possibly can, to plant more or less evergreens for wind-breaks; such as red cedar, Scotch and Austrian pine, Norway spruce and hemlock; all of which do well on our prairies, and can be obtained of nurserymen cheap.

What a beautiful country we soon would have if every man owning and living on a prairie farm, would plant about his premises a few dozen evergreens every year, for five or six years in succession. It would soon look like the land of promise; the dreary waste would disappear, and coming generations "rise up and call us blessed." Evergreens may be grown in large quantities from seed. I have thousands on my farm now, from three to six feet in height, raised from seed a few years since. But the difficulty in procuring seed in this country would deter many from attempting to propagate them from seed. I sent to Germany for my seed, and obtained them at less cost than they can be purchased in this country. But red cedar is easily obtained here, and should be propagated and planted. The seeds of the pine should be planted early in the spring in beds, and covered with leaf mould. When they germinate and show signs of coming through the ground, they should be shaded, and the shade should be kept over them until the hot summer weather is passed, when it may be removed, and then they will do well if kept clean from grass and weeds. Cedar seed may be planted in the fall and covered with leaf mould, and when they begin to come up, shaded the same as the pine.

S. P. Boardman.—In forestry I have had but little experience; have a number of thousands of soft maples growing, now two years old. In this latitude we have to go to the creek bottoms and gather our seed, as near as may be, just about the 20th day of May, one year with another. Plant the seed in drills immediately; drills some eight or ten feet apart, the seed to be covered not to exceed an inch in depth. If kept well cultivated will make a growth of from eighteen inches to two and a half feet the first season.

I plant walnuts in the fall as soon as gathered; plow furrows and drop them in, then plow a furrow on them to cover the seed. I am also planting peach seeds in groves, for shelter, fuel and fruit. By having them quite thick we sometimes get peaches in such groves even when they may be all killed in the orchard.

I haul my wood seven miles, and I am satisfied that I can grow it cheaper than I can *haul* it that distance.

B. Sweet.—Forestry: One would think to advise anything relating to this would be absurd; but it is a stubborn fact that even so-called arborists commit unpardonable blunders. They will take no lessons from nature; nor even when passing through young groves will learn anything but this fact, patent: "These trees ought to be pruned." And this in the face of the truth of nature's teachings.

Examine the young grove which has been pruned two years, and you will find worms eating opposite the scars made by pruning; and as the tree grows in years it grows larger in bulk around the place abused, because the sap jets are eaten off, and the quantity of sap ascending and descending must go round that obstruction, and build you a hollow tree *while the worms* work it inside.

But suppose you suffer no pruning of a tree, except that of dead limbs, would you have a hollow tree? Impossible.

To get healthy groves it is indispensable to begin with the seed, and then do not prune. If you would have low-topped, bushy, spreading heads, set them at a distance, keeping them in open space.

If you would have tall trees, plant thick. The soft maple being adapted to any soil, hardy, and of rapid growth, is perhaps more profitable than any other. Hard maple, better known as the "sugar tree," is adapted to any drained soil.

Groves can be set to suit the taste for shelter. We would prefer every grove designed for shelter for stock, to be mixed or surrounded by the native white oak, which, while young, retains its leaves all winter, and by cropping some of them every year, say in winter, you can have a shelter as good as evergreens afford.

G. W. Vaughan.—I have not experimented much in raising timber from the seed. They can be raised to be good-sized trees in a few years by tilling them like fruit trees. I have seen walnut and other trees raised from seed, at ten years old six inches in diameter at the root. Cottonwood or Columbia poplars often measure 12 or 15 inches at the ground at ten years old, but they are too sappy to be valuable. They, however, make good summer wood if well dried. Trees of any kind are of great value for shelter from flies in summer.

D. Gove.—I have grown from seed a heavy belt of soft maple, black and white walnut, around my orchard. It has now been growing six years from seed, and is from 10 to 20 feet high, and very thick. I have so arranged the orchard and hedge and belts that they protect my house and feeding lots from the north and west winds, and at the same time afford shade for stock in fields on either side. The walnuts I planted in the fall, after thoroughly preparing and checking off the ground eight feet apart, each way, put one nut in a place, and covered about three inches deep, and there is not more than one in fifty missing. The soft maple seed I planted on the 16th of May, fresh from the trees, after a thorough preparation and marking off the ground each way with a corn marker. I set four feet apart, leaving out a row in the centre of the belt to drive through if necessary. I set the seed out like setting out cabbage plants, putting the bean end down about one inch deep, leaving the feather end sticking out of the ground. Nearly every one came up, but the cut-worms cut out a few, say about one in thirty. I cultivated them thoroughly with double shovel plow and hoe, for the first three years. The fourth year they had full possession, and since they have not had any cultivation, but have made a very rapid growth. I am satisfied that the planting and cultivating of those belts is the best investment I have made on my farm.

J. Balsiger.—Concerning the woodlands and timber growth, I have to refer to what I said about the natural growth in this neighborhood. The free range of cattle and hogs—not yet abolished in our precinct—have heretofore prevented any trial of timber planting. They destroy any young growth of timber coming up spontaneously, as well as the seeds of the older trees, that might produce a new growth. As long as people are not obliged to keep up stock of any kind, it would be useless to plant timber, except when fencing in the land. But as there are already too many fences to be built and kept in order, to protect the farm crop, this would hardly be practicable for most farmers.

15. LIVE STOCK.—Cattle, horses, mules, sheep, swine: breeds preferred: breeding of each: rearing and training: dairy management: fattening of animals: wool growing: management of manures: diseases.

M. A. McConnell.—We have always preferred large, heavy horses; they are the best for all kinds of work.

In the line of cattle, we prefer the Durhams for the butcher and stall feeding. For milk, we prefer the native cows, as we have always found them the hardiest; to keep on the least feed and to give the most milk; but this quality always runs in families.

Sheep we have kept on our farm for the last 28 years, and have always found them to pay well. The best for wool are the merinos; for mutton, we think, the Bakewells, as they are large and fine sheep.

The hogs have always been a source of profit to the farmer. We have grown the Berkshire, Leicester and Chester Whites, and found them to pay, generally, though not always. But we can't get along on a farm without them; and so, in regard to sheep and cattle. No good farmer can dispense with that kind of stock, as they are necessary for making good manure, and without manure no man can keep his land in good condition.

H. Pierce.—Of swine, the Chester White is allowed to be the best.

J. Tefft.—Cattle: For milch cows we prefer a cross of the Durham with the native stock. As our farm is mostly used as a dairy farm, we have but little experience with other stock.

The food preferred for cows is good clover and timothy hay, or red top with corn meal and bran or oatmeal, or the three mixed, in the proportion of, corn meal, 4 quarts; bran, 8 quarts, and oatmeal, 6 quarts. About one peck of this mixture per day, for a cow, is the quantity required for winter feed.

J. Schoenleber.—As for my idea about stock—it is cheaper, and we get a better stock of cattle by keeping them up.

C. E. Barney.—Mules are better than horses, if well used and not abused.

No stock can be bred *up* or *down* so fast as hogs. Breed one litter in spring from old sows—let the sows be large and the boar fine—feed well all the time, so as to make *fatness* a *natural condition*.

4,000 bushels of corn cost as much or more than 4,000 pounds wool. Small flocks will yield more wool, in proportion, than large ones.

A. Rankin.—I have had some experience in raising horses and cattle. I do not think it advisable to breed a mare until she is four years old; the horse ought to be as old or older.

In raising cattle, I would not breed a heifer until she was two years old. Bulls will do to use at one year old, where they have been well fed and are good size.

The most important item, in raising both horses and cattle, is their care for the first winter. They should be supplied with an abundance of good hay and fodder; with oats and carrots fed twice per day, so as to keep them in a healthy and thriving condition. They should have free access to salt, also, with plenty of fresh water and a good shed for shelter in stormy weather.

In breeding hogs, I let my sows go to the boar when they are about eight or nine months old. I prefer a boar that is at least one year old. The sow should be liberally fed after she takes the boar, so as to keep her in good growing condition but not too fat. A fat sow is more apt to lay on her pigs, and her milk is not so good as one in moderate condition. About a week before pigging she should be

separated from the rest, and be furnished with a good dry place. She must be fed at this time with ground feed and bran. Give her a little sulphur and salt once a day in her food, as sows are apt to be costive at this time, which makes them feverish and restless. After pigging she should be fed on ground corn and oats mixed with the slop from the house. The food ought to be cooked or soured. Sows ought to have a good clover pasture to run in as soon as the pigs are old enough to follow. The ground corn and oats are also the best feed, mixed with a little oil, to fatten cattle and hogs; for hogs it ought to be cooked.

I put my manure in piles with dirt until after harvest, when I haul it to the meadows or stubble. Last fall I hauled out from town 1,000 loads, and put on my corn ground, after gathering my corn.

The only disease among the stock is what is commonly called the hog cholera. My opinion is that medicine never has done any good as a cure, for the reason that when a hog has it he is generally not noticed until past cure. But I will say that, if there is anything in the saying that "An ounce of prevention is worth a pound of cure," it certainly can be applied in this case; for I believe with a good warm, dry place for them to sleep in, and a good clover pasture to run in, with plenty of fresh water to drink and free access to salt, limestone, coal and charcoal, they will not take the cholera spontaneously.

I keep horses, cattle and swine.

Our horses are a mixed breed, generally too small for good farm horses. My idea of a good farm horse is an active, well formed horse, of not less than 1,200 pounds weight.

Our cattle are mostly grade and native; some few, full blooded Durhams. The grade cows are the best for milk and butter; and I think, at the present prices of Durhams, the grade cattle are the most profitable for beef.

We have all kinds of hogs, but the dark colored are altogether the best for the prairies of Illinois. I raise Berkshire, Poland and China, mixed, and Chester white. The Chester Whites and Suffolk are both very fine hogs, where they are kept perfectly clean, and will produce more lard than any other breeds. But hogs, to be profitable in Illinois at the present time, must go out in the fields, in the sloughs, and almost every other place on the farm at some time of the year, and take it rough and tumble, particularly when corn gets up as it is at present. I find that the white hogs will get mangy, and will not keep up with the black or spotted hog. I have my fences all hog proof. As soon as I stack my wheat and oats I turn my hogs into the stubble; also, after I gather my corn, I let them into the corn field. I mean my sows and young hogs.

H. Sodowsky.—I have been engaged in raising live stock for the past 40 years. I have been raising thorough bred Durham cattle more than 20 years, and I find that as our country grows in wealth and population, the demand exceeds the supply. I have had more inquiries for blooded stock during the past year than for several years back. I keep a number of cows, and give all the milk the cows give to the calves until they are from 6 to 8 weeks old; then we feed them threshed oats and shelled corn, or meal with a little oil cake. Sheaf oats, with plenty of good hay, is good feed also. If you raise calves for sale, the better you feed, the better it will pay, and the sooner you will find sale for your stock. Thorough-bred cattle pay better than scrub stock. Where land is worth little, it may pay to handle poor stock, *but with land at $50 or $75 per acre, the farmer will find it to his advantage to keep the best of cattle,* and on the best of pasture. A few thorough-bred cattle will pay

him better than a great number of ordinary kind, as it costs no more to keep a good animal than a poor one. My father sold 4 steers that averaged 2,940 pounds to the steer, for $1,200, which was $300 per head. One of my brothers sold a lot, of ten or twelve steers, the fall after they were three years of age, at $220 per head.

I have raised a number of varieties of horses. The thorough-bred has more elasticity than any other, and is the best for the saddle and driving in light harness. It is, too, the fancy horse for the fast man, and brings fancy prices. But Illinois is a farming country, the soil is very rich and fertile, and we need a variety of horses. We want large, solid farm horses, which we can hitch to a plow and turn up the soil 8 or 10 inches deep, or pull a good heavy wagon load. I have tried some of the Norman horses, and I prefer a medium horse to these Conestoga breeds.

In sheep, I have tried the Southdown, Leicester, Cotswold, and French and Spanish merinos. I think to cross the Southdown and Cotswold, and Leicester and South down makes a better breed than either separate. The Spanish merino is the best for the prairie.

I have raised the Berkshire hog and the Chester White. I think crossing them together makes a better hog than either separate. The Berkshire hog is a smart, industrious fellow, and thinks it no hardship to work for a living. The Chester is inclined to fat early, and fattens well at any age. The Bedford is a good hog, not second to either I have mentioned.

S. P. Boardman.—I raise but little stock, except sheep. Aim to keep mules and horses enough merely for teams to do my work, cows enough to make the family milk and butter, and hogs sufficient for my pork, except a few pure-bred hogs, to sell for stock purposes.

Now that outside range is nearly gone, in my immediate vicinity, I intend to keep only about what sheep my farm can carry; shall sell down to about fifteeen hundred.

There is a feeling quite common in Central Illinois, particularly among the old settlers, that it will never pay to keep sheep when range is all gone. The feeling exists in some measure in regard to other kinds of stock, but not in so great degree. Allied to this is the notion that a man is half ruined when he is compelled to put part of his land in grass. This notion is quite prevalent in this section, particularly with the owners of "eighty" and "quarter section" farms. I honestly believe, that if one-half the acres under cultivation in Central Illinois were in tame grass, and the same labor expended on the cultivation of the half that is now spread over the whole, there would be as many bushels of grain raised as at present. Ground would be plowed eight or ten inches deep instead of four or five; corn would be cultivated four and five times, instead of once or twice.

There was a large bulk of not very wise testimony gathered and printed in the State Agricultural Society's Volume of Transactions, a few years since, going to prove that our soils could be skimmed in corn twenty to forty years in succession, without applying any manure, and yet continue to raise large crops. I know the point sought to be established was the richness of our soil, still we came near proving too much.

In sheep husbandry, we will soon be compelled, in all sections of the State, to pasture sheep on our lands wholly. When this becomes the case, the only way to make a profit will be to stock light and keep only our best sheep. One thousand head, culled closely every year, and given a first rate chance, the year around, wil pay better profit than fifteen hundred ordinary sheep kept in an ordinary manna

and which see two or three small backsets, it may be, in the course of the year. Breeding, feeding *and light stocking*—on these hang all the profits in sheep keeping.

The American merino is the best breed, I think, where large flocks are kept. The Cotswold, I judge, is the most profitable breed among mutton sheep.

G. W. Vaughan.—The Durham stock is preferable to any other among cattle, being larger and smoother than any other breeds, and more in favor with cattle raisers. Of horses, there are many kinds, some of which take the name of the owner of the first sire, as "The Dan," for Dan. Randolph. The Dan is among the best farm stock. The Morgan, Nigger Dick and others are among the best for general use. I never saw a better show of horses than was exhibited at our county fair, last fall.

The best mules are from descendants of the mammoth stock of Jacks.

Sheep are very much mixed. In this neighborhood there are a few French merino, also a few Southdown, which is a good sheep. Most of our sheep are the common, long-wooled, or merino mixed. Fine-wooled sheep are the best for fine cloth.

The Chester White is considered the best stock of swine.

I prefer breeding mares in May or June. I do not approve of breeding them in the fall.

Bucks should be kept from the ewes until November or December; the lambs are much more likely to live.

Hogs should not be allowed to propagate till they are a year old. This rule is not followed here, and one can see its result in the hogs we have. There is not the pains taken with swine that there should and would be were farmers more certain they would pay for the trouble. They die so often with cholera, that little effort is made here to get the best quality.

Farmers here rear their horses until they are three or four years old, and then break them as best they can. A few adopt Rarey's mode of training. Farmers generally have but little trouble breaking horses.

Our cattle are fed shock corn on the ground or in pens for the purpose. I know of no stalls for feeding and fattening cattle in our county. Hogs are turned in after the cattle have eaten, to pick up the scattered corn and offal. Hogs fatten better in this way than any other, unless in being fed swill and corn together.

Horses fatten best on chopped feed, rye, oats and shorts, with a little corn; but as it is troublesome to feed a lot of horses in this way, I generally feed horses hay, oats and corn, and I find they fatten well by having all they can eat.

Sheep are so injurious to pastures that I have kept few, and know little about them.

D. Gove.—There is one other matter that seems to me to be of very great importance to the farmers of this State, in a majority of localities, that is how we are to obtain plenty of pure stock water, and, as necessity is the mother of inventions, I will give my experience in this matter:

I found that it took a great deal of labor and expense to water stock from wells, even if the water in the wells hold out, which, in those dry seasons they will not. I then went to work and made artificial ponds, one of which, I dug very deep and wide, and it has held out through the past dry season, affording water for a large number of stock: but when winter comes, it freezes up, and it is a very cold, disagreeable job to cut the ice, and when that is done, there are always some cowardly animals that will not venture near enough to drink; and, again, the water from

under-ice is so cold that it makes stock shiver, as though they had the ague, which certainly does not add anything to their comfort or well doing. The pond being a disagreeable thing for both man and beast in winter, I am now trying to make an artificial spring thus: Immediately south of my barn, there is a small ravine that empties into a large branch, 80 rods east. I have here made an excavation, sufficiently deep to put up troughs, with an open ditch for the waste water to pass off. I have here put in a stone wall, with a place arranged in it to receive the end of a trough; I here start, first, with gas pipe of inch and a half capacity, with a faucet of the same size over the end of the trough. I have run the gas pipe 166 feet, on a grade of 4 inches to the 100 feet, and here the pipe is five feet under ground; I here commence laying 2-inch pipe tile, after puddling substantially around the gas pipe, at the junction with the tile. I am laying the tile on the same grade, going off through higher ground for half a mile, and will put a great portion of the pipe from 7 to 12 feet under ground. I am running this pipe close by an artificial pond, so that if the surface water should give out, I can lay a switch of gas pipe into the bottom of the pond, and thus have a supply. The faucet at the outlet can be adjusted so as to let the water run at any desired rate. I have now laid 80 rods of pipe, and have a continual stream of water sufficient to water a large number of stock, and yet I am only half done. This is an experiment with me, having never seen nor heard of such a thing, and it may possibly fail, but I do not see how it can; and as I have a great deal of faith in it, I have thought fit to mention it, and place it at your disposal.

J. G. Swann.—Horses: mixed blood—Lion, Empire and Cub stock. Hog: Chester white preferred.

For fattening animals, plenty of good corn, hay and oats. Stable manure should be well spread on.

J. Balsiger.—Of live stock, I have kept, until now, only the common breeds. I will let those more experienced than I am, give their views, which might be the most profitable breeds, etc. I believe, for dairy purposes, our common kind of cattle, if kept well, to be about as good as any other.

J. Y. Bothwell.—I keep the Durhams, and in good growing order until I sell.

In sheep, the Southdown and Cotswold; think them the most profitable.

Hogs: Chester white.

I raise the largest mules, thinking them most profitable. Keep but few horses, work mules altogether.

My lambs come in April. My mutton sheep, two years ago, sold at $10 and $12 per head. They are the cheapest meat that can be raised on a farm.

My pigs come the last of March, and dress from 225 to 250 pounds the next winter. Do not keep any but breeders over.

I find shock corn to be the best and cheapest feed for cattle, mules and sheep.

J. Barber.—Manure is saved carefully, and scattered over the farm where most needed, and put in hills of vines, etc. I wish to call attention to the fact that earth thrown from cellars and wells, when spread upon the soil, and after receiving the action of frost, operates as an excellent manure. What elements it may contain beneficial to the soil, I can not tell, but have noticed it in repeated instances.

14. Other Domestic Animals.—Poultry, bees, silkworms, etc.: best breeds: rearing and management: diseases.

M. A. McConnell.—We have kept Shanghais and Bremens; these are the best for all purposes. They are large, and good layers; take good care of their brood, and are not mischievous about the yards.

H. Pierce.—A cross of Dorking, Shanghai and the common fowl is, I believe, preferred, although the black Spanish is being introduced with fine success.

A. Rankin.—The Domingo fowls are the most profitable to raise, as they are good layers and setters, and good for the table—I mean when left to hunt their own living. I consider Brahmas, with a little extra care and feed, a very superior fowl.

Rev. G. W. Minier.—Aye, sir! Did you ever know a preacher that did not like poultry and honey? But, let me whisper this in your ear: They prefer eating them to rearing them, and study their peculiarities on the table, rather than running at large, or roaming in quest of the "healing dew."

Although the earth was cursed for man's sake, yet a beneficent Creator has placed within his reach many comforts and blessings, that he may enjoy by making use of the means to obtain them, and of these, none, perhaps, repays with greater yield the labor bestowed, than the honey bee. Those that have taken proper care of them have not only enjoyed the liquid nectar of their rich store houses, but have received large remunerative profits in return. But, like all other stock, they must have proper care and attention. First, they must have the right kind of a hive. The one I have found the best is a square box, containing from 1,800 to 2,000 cubic inches, with movable frames, and a cap on top, covering a box the same size as the inside of the hive, that will contain from 25 to 30 pounds of honey. But the box should not be put on when the bees are first put in the hive. There should be a thin board, the size of the top of the hive, which I call the honey-board. This should be put on top of the hive, to prevent the bees from coming up into the box. The honey may be set on the honey-board, and the cap put on; and when the bees have filled or nearly filled the frames in the hive, then take off the cap and honey-board, and put on the honey box with the frames. The honey-board may be laid on top of the honey-box, and then put the cap on, which is a covering for all the top. In a good season, a strong colony will fill two such boxes, which we call surplus honey. But, in order to have bees do well in this latitude, they should be housed in winter. A room that will not freeze is best. The idea of some, that bees freeze up in winter and thaw out all right in spring is very erroneous. If bees once freeze they never come to life again. The best place to winter bees is in a dry, side-hill cellar, made dark. But, as few people have such a place, a small room in the dwelling will answer, made perfectly dark. But if that cannot be had, set all the stands together and cover with straw. I would recommend those that have bees to get Quimby's work on bee-keeping.

T. Gregg.—Bees are beginning to attract attention, and are increasing rapidly. Italians are being introduced. The bee moth is very destructive in some instances. I am not cognizant of any very effectual remedy.

H. Sodowsky.—I have raised the Shanghai, Cochin China, Brahma Pootra, Hunter's Dominico and Black Spanish. The Hunter's Dominico is the largest chicken I have ever seen. The Black Spanish is the best layer, the liveliest and smartest fowl I ever tried. It is a very healthy fowl. When cholera prevailed among our fowls, killing most of our large fowls, it killed very few of the Black Spanish. It is, too, a handsome fowl. The cock is a dark, glossy green, while the hen is black, with *white gills* and face. They are medium size, not much at setting, but extra layers.

I have had common white geese; also, a much larger variety, called the Bremen. The goose and gander are both white. Last fall I was in the State of Ohio, and saw a species of geese, called the Hong Kong, the largest I ever saw. The goose and gander are of the same color, a blue, or rather a gray. I had four shipped to me in January. They have been laying since the middle of February. They say these geese will weigh 50 pounds to a pair. They are the largest I ever saw.

I have, also, a variety of turkey, called the Bronze turkey, that is the largest and finest I have ever seen.

As to bees, they are a sect I have nothing to do with. They do not like me, and there is no love lost on my side. I have a fine sugar orchard, and we have all the maple sugar and molasses we can use, besides other varieties of sugar and sweet things; so we can live independent of the bees.

G. W. Vaughan.—We raise no poultry but for our own use. The mixture of Shanghai with the common fowl is the best, not being so subject to disease as others.

J. G. Swann.—The common small breed is best for eggs.

J. Barber.—Bees have succeeded well. I use the square box hive, containing about a cubic foot. Place glass boxes upon the top, and cover with a cap.

17. Rural Architecture, etc.—Houses, barns, (for hay and grain and different kinds of stock,) root and fruit houses, etc.: the materials preferred: best arrangement for economy of labor and comfort?

M. A. McConnell.—We have three houses on the farm, all made of wood, with a wing attached. We have 5 barns; 2 for grain, each 33 by 60 feet; 2 cow barns, one 28 by 44, and one 28 by 60, 7 feet in the first stories, and 9 in the second for hay. The cattle stand with their heads toward the centre, and are fed out of the alley. Then we have a sheep barn 22 by 60, with racks to feed the sheep in; a horse barn, wagon house, corn crib, and a shed to keep tools in; also, a cheese factory, 30 by 128 feet and two stories high, where we made, last year, 185,000 pounds of cheese for our neighbors and ourselves. We charged for making, 2¼ cents per pound, and found every thing. The factory is supplied by water that comes in at a temperature of 45 degrees.

C. E. Barney.—Vertical boarding for corn cribs is much the best. Generally speaking the best barn is the one in which the corners are farthest apart.

A. Rankin.—My buildings are common affairs. My barn is 48 by 24, and holds hay enough to feed the horses and cattle necessary on the farm, after they have eaten up the stalks. My hog sheds cannot be excelled for comfort to the hogs. The sheds all run east and west, and are twelve feet wide; made perfectly tight on the north and east and west. The shed is covered with slough grass, and topped off with bagasse fresh from the mill, which will never leak or blow off if well put on. The pens are all floored and kept clean. The hogs are bedded with wheat straw. When my sows have young pigs, I give each sow 8 by 12 feet under the shed. Each pen has a door opening into a yard on the south. After the pigs are weaned, I take out the partitions and let them all go together, still keeping it clean so as to prevent dust, as pigs will not thrive in dust. They all have good pasture in summer.

A. C. Hammond.—The introduction of the horse fork, by which hay can be elevated to any desired height, bids fair to revolutionize the whole system of barn building. Under many of the barns now built basements are constructed, to be used for stabling, storage, etc., and the whole upper portion used for hay. Under a portion of my own barn, built the past season, I have constructed a fruit cellar seven feet deep, and thirty feet span, with double doors and windows, and double floors over head. I shall remove eight inches of dirt from the bottom and replace it with pounded rock and cement both bottom

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and sides with hydraulic cement. The cellar under my house, which was formerly wet and infested with rats, has been treated in this manner, and it is now perfectly dry and free from the encroachment of vermin.

S. P. Boardman.—In sheep-keeping there is not a doubt but sheds enough to shelter all the different divisions of a flock, pay a large interest on the investment. I have not as yet been able to form an opinion whether it would pay to build large hay barns or not. It is easy enough to figure up the difference in amount of hay saved by barns over stacking, but there are other considerations which complicate the problem. To put a large hay crop in barns takes much more time than to stack it in the meadow wherever most convenient. In "catching weather" it frequently is of great importance to put up large amounts of hay in a short time. I find that I can "rope up," or "slide up," and get into the stack nearly double the hay in the same length of time that I can put on a wagon and haul to a barn. It is also much easier loading from the stack, in feeding out, than from the mow. I think, perhaps, when one had all the other buildings and improvements generally, it might then pay to build hay barns—one of the things to come in just before tile draining. Only such "high farming" will be practiced in our State as will bring in money enough to pay the cost—that, too, in a year.

For sheep-barns (used merely as shelters) our flock-masters use, nearly altogether, low double-roofed sheds inclosed on all sides. They are usually from 100 to 200 feet in length, and from 26 to 30 feet in width.

J. G. Swann.—My house is 18 by 40. Cellar under all. Two stories high; five rooms; upper and lower halls 8 feet wide. An L kitchen, 16 by 24, one story, with hall 6 feet wide.

A common stable, 8 stalls, a corn crib and cow shed. Stable 36 by 36. 10 foot stable, on north side for hay and corn. 16 feet center cow shed, on south side 15 feet.

J. Balsiger.—My buildings are of the most common kinds, *i. e.* some of frame and some of logs. I think brick buildings for dwellings, as well as for stables, preferable, more durable, and both warmer in winter and cooler in summer.

18. Fences.—Material preferred: cost per rod, and cost of keeping up hedge, board and rail fences: value of hedges for protection: is it cheaper to fence out stock than to keep them up?

E. Moss.—Osage for hedge is thought most desirable. Fence stock in. Not allowed at large.

M. A. McConnell—We think pine boards and burr oak posts preferable to anything else, and the cost is about as follows, per rod:

2 burr oak posts, 15 cents each	.30
34 feet boards, at 2 cents per foot	.68
1 lb. nails	.06¼
Making	.15¾
Total per rod	$1.20

Hedges do not do well in this climate. The winters are too cold, and they freeze down; but if they could be grown as they can farther south, they would be a great protection to stock, and very much cheaper than any other fence.

H. Pierce.—Osage orange costs $1 per rod for making a good stock fence. The cost of keeping up a post and board fence for 10 years averages 25 cents per rod, and then it must be renewed almost entirely.

Hedges are much used around orchards, and are valued highly as a protection. My opinion, after a careful calculation of the land that is occupied by fences around a farm, and cross fences, wear and waste, is, that it would be far cheaper to keep cattle up, though, as yet, we have a large lot of land unoccupied, upon which the large cattle owners pasture their stock, to the manifest injury of the poorer man, who must fence them *out at a first cost* of not less $2 per rod, and then some fine morning wake up and find

his fields of wheat or corn destroyed by from 50 to 500 cattle filling themselves and trampling down the remainder; and no recourse left but to pocket the loss with as good a grace as he can.

J. Tefft.—For road fence we prefer wire, as it turns unruly stock better than board fence. Costs about 50 cents per rod when well made.

C. E. Barney.—Quaking asp poles, cut, split and peeled in summer, nailed on good, seasoned posts, make a light and very strong fence. Cut eight feet long.

I think, if no stock was allowed to roam in the roads and lanes, people would have better stock, take better care of it, and make more money on it.

V. Aldrich.—Fences here mostly made of rails, called the Virginia fence. The staked and ridered fence, where timber is plenty, is the best. In this locality the post fence, with rails or boards, is fast taking the place of the old worm fence. Either of them will cost from $1 to 1 25 per rod.

Osage hedge, properly made, I prefer to all other fence. The plants cost from 62 1-2 to 75 cents per rod. It will require four or five years growth to make a substantial fence. I formerly cut it back each year, but now prefer to let it grow as fast as possible, until large as fork stobs—10 or 12 feet high, or more, then lop it by cutting each one about half off near the ground, laying it in an angle that will make the top high enough for the fence. It will sprout up through this and become very thick and still retain life in the main lopped stem.

When I desire wind-breaks I let them grow their own way after lopping; prune other places to suit. The cost of a hedge is less than keeping up other fences.

I am greatly in favor of keeping up stock. Which is cheapest, to fence in or out? I don't know, but believe least trouble to arise from fencing in.

A. Rankin.—I think Osage orange is the best material for fencing. The next best is made by using large, round cedar posts, with three boards and three wires; costing about $1 60 per rod.

It is decidedly cheaper to put up stock than to fence them out.

G. W. Minier.—Osage orange hedge every time and all the time. Mine, completed, cost just twenty-five cents per rod. Board and rail fences will soon be obsolete. We can hardly estimate the value of hedge as a wind-break and modifier of our bleak climate.

"Is it cheaper to fence out stock than to keep them up?" Yes; by at least fifty per cent.

T. Gregg.—"All sorts" of fences abound. White oak posts and pine lumber are very extensively used as a first fence, both on the prairie and on the bluffs. The Osage orange succeeds well and is being planted in great quantity. It is believed to be the best material for live fences for this region, and will have to be generally resorted to. That earlier planted has, however, been much neglected; so that it is a rare thing to see a really good and beautiful live fence in the country. But the slovenly habits of our people are gradually yielding to the influence of better teachings, and there is a marked improvement taking place.

A. C. Hammond.—The Osage orange is the cheapest, best and most durable fence. It can be planted, cultivated and trained until it forms a perfect fence, for 50 cents per rod, and afterwards annually pruned for 5 cents per rod. A board fence cannot be built for less than $1 25 per rod, and I find the expense of keeping it in repair greater than that of trimming the hedge. When properly pruned a hedge is of little value for protection.

If the farmers of Illinois were to keep their stock up, instead of fencing it out, it would undoubtedly add hundreds of thousands of dollars annually to their pockets.

W. A. Allen.—Hedges preferred for fencing. Cost now, $1 per rod. Keeping hedge trimmed costs $8 per mile per year. Keeping up a board fence costs nearly all your

time, besides boards and nails. Hedge for protection is very good, but does not equal the grey willow.

It is cheaper to fence stock in.

S. P. Boardman.—In the way of fencing, public interest in Central Illinois is now entirely concentered on hedge. Since the discovery and practice of plashing has come about, there are but few doubters as to the complete efficiency of the Osage hedge. Many of the old hedges (rather attempts at hedges) which were considered not only failures but nuisances, have been made, by plashing, to turn all kinds of stock.

G. Harding.—My experience is in favor of a live hedge fence of the Osage orange. It gives shelter to stock; is a good wind-break, and an everlasting and effectual fence, at a cost of 60 cents per rod, when large enough to turn stock, and an annual cost of two cents per rod to keep the same in repair.

I consider it cheaper to fence out stock than to keep it up.

The Osage is best for a live fence. If managed rightly, it will turn any kind of stock in 3 or 4 years from re-setting in the hedge row. We have no machines for cutting hedges. The plan I have followed for preparing ground, setting, tending and trimming plants, is this: Prepare the ground in the fall, then break deep in the spring by throwing together several furrows. Run one furrow in the centre, set the plants in it eight inches apart, then cover the root to the same depth as in the nursery. If the ground is rough or cloddy, roll or harrow, or both. Plow well with the double shovel and hoe them well for the first and second years, then use the turning plow. If good-sized plants the first year, they may be plowed the second by the turning plow. I find a ditch on either side the hedge essential, to make the roots strike downward and not spread when the plow runs near them. If there is no ditch the roots will be broken by the plow and then sprout and spread. If the land is not tilled the ditch is unnecessary. If made at all it should be finished by the third year. I do not trim hedges until the third year, when, if of sufficient size, I cut the plants half off and bend them down along the row. The young shoots will again start where the plant is cut off, and when cut form the height of the fence, while the ones bent down stop all holes. If not well trimmed the young shoots will shade those bent down so much as to cause decay. The cost of hedge fence varies according to its width and the manner in which it is tended. As I set them it takes 2,000 to 80 rods, costing near here $2 50 per thousand, making $5 to 80 rods. The labor of setting, etc., about $6. Therefore it will cost about 20 cents per rod for setting hedge, including cost of plants. After being set it will cost 20 cents per rod to till and trim the hedge, which should be trimmed once or twice each year after the 3d or 4th year. With machines there would be little expense in keeping up the hedge once well started. I prefer rails for cross fences, as they are often moved. A rail fence costs at least $1 25 per rod, if made out of good rails, such as oak, ash, walnut and red elm. A board fence costs $1 35 or $1 40 per rod, if of oak; more if of pine lumber. Where one is fencing against cattle and horses only, a three-board fence will answer, and will last until a hedge fence can be made. Hedge fences are the cheapest the farmer can have, and afford good protection to stock and fruit. Orchard trees are much less liable to blow down when a hedge protects them from the wind.

I think and am sure that in any part of the country where the land is not fenced, it would be much cheaper to fence for pasture to keep stock in, than to fence the whole of the land in order to keep stock out of the farms.

S. Butler.—Rail fence costs $5 per hundred.

We, as a general thing, fence out stock, and keep it up if we choose.

D. Gove.—I have tried all kinds of wooden fences, and at best they require a great deal of repairing to make them safe. I have also had considerable experience in hedging; and it is just the fence for this prairie country. It will cost less to make it and keep it in repair than any other fence, and it bids defiance to high winds or any kind of stock. It can be made sufficiently strong to turn any kind of stock for 75 cents per rod, and can be

kept in order for 10 cents per rod per annum; and if the wind blows your fence is in no danger; which is quite an item.

"As to fencing stock out or in," my theory is, to fence them in. If I own stock is it not just that I should keep them where they cannot injure my neighbor, who has no stock?

J. G. Swann.—Eight rails high. Black and white oak. Staked and ridered. Costs 75 cents per rod. Stock kept up.

E. A. Reihl.—It is much cheaper to fence stock in than to fence out.

J. Balsiger.—My fences are the common rail fence. Having plenty of timber, and not so much capital at my disposal, these were more convenient for me than board fences. But I am now beginning to plant Osage orange hedges, believing them to be, when well raised and cared for, the most lasting and the cheapest fence; and requiring, when once grown, the least labor to keep it in order; and, moreover, serving as sheler belts against the blasting winds. We have in this neighborhood, many, I dare say, perfect hedges of Osage orange.

I think it more advantageous to keep up stock than to let it run at large; though I know that fences, and keeping them in order, are a heavy charge on the farmer, as well for the work they demand, as for the timber they consume, especially rail fences, while board fences are very expensive.

J. Y. Bothwell.—I have half a mile of Osage orange hedge. It is good. I set the plants 18 or 20 inches apart, and cultivate well until they are from an inch to an inch and a quarter in diameter; then lay them down close to the ground. In April, confine them there by laying rails or poles on them. In July, remove the rails or poles. In one year the fence will turn any decent animal, and in another year it will turn anything. I also have two miles of plank fence, made as follows: Split white oak posts, split square, 7 1-2 feet long; set them top end of timber down. Use post augur 8 inches in diameter. Set the posts 5 feet apart. Use white oak plank 15 feet long, 1 inch by 4; use one nail and six planks to the panel. It makes a good tight fence, and costs $2 per rod here, where it is cheaper than a rail fence, as timber is cheap. The balance of my fencing, 5 1-2 miles, is made of rails, but I shall make no more such. The hedge is *the* fence; when it cannot be used, the style of plank fence I have described is the cheapest and best I have found. I do not trim my hedge at all, as I consider it time thrown away, and injurious to the health of the fence. Let it grow; it will not get very high, and if it should, 'twill make a good wind-break against the cold prairie winds. As for side trimming, it does not become very wide, the growth is chiefly upward.

T. Engelmann.—The old worm-fence is slowly disappearing and plank fence taking its place. The cost of constructing a plank fence in this locality is about $1 85 per rod, to-wit:

Two white oak or overcup posts, 25 cents each	$ .50
Forty feet fencing at $30 per 1,000 feet	1.20
Nails and labor	.15
Total	$1.85

Osage orange hedges have been tried to some extent. With proper care they may afford sufficient protection, but on an average they have failed to give satisfaction.

The land in St. Clair county being nearly all in cultivation—all, except comparatively small bodies of it in the river and creek bottoms—so that in a few localities only, the stock which was running at large was able to maintain a poor existence for a few months of the year, on the so-called common pasture. It has for many years back been a fact, well understood by all farmers, that the benefit derived from that pasture was insignificant in comparison to the costs of making and keeping up fences, and efforts have been made to compel the owners of stock, by legal enactment, to keep up the same; but they have always been defeated *by the opposition of persons who own no land, or only small*

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and sides with hydraulic cement. The cellar under my house, which was formerly wet and infested with rats, has been treated in this manner, and it is now perfectly dry and free from the encroachment of vermin.

S. P. Boardman.—In sheep-keeping there is not a doubt but sheds enough to shelter all the different divisions of a flock, pay a large interest on the investment. I have not as yet been able to form an opinion whether it would pay to build large hay barns or not. It is easy enough to figure up the difference in amount of hay saved by barns over stacking, but there are other considerations which complicate the problem. To put a large hay crop in barns takes much more time than to stack it in the meadow wherever most convenient. In "catching weather" it frequently is of great importance to put up large amounts of hay in a short time. I find that I can "rope up," or "slide up," and get into the stack nearly double the hay in the same length of time that I can put on a wagon and haul to a barn. It is also much easier loading from the stack, in feeding out, than from the mow. I think, perhaps, when one had all the other buildings and improvements generally, it might then pay to build hay barns—one of the things to come in just before tile draining. Only such "high farming" will be practiced in our State as will bring in money enough to pay the cost—that, too, in a year.

For sheep-barns (used merely as shelters) our flock-masters use, nearly altogether, low double-roofed sheds inclosed on all sides. They are usually from 100 to 200 feet in length, and from 26 to 30 feet in width.

J. G. Swann.—My house is 18 by 40. Cellar under all. Two stories high; five rooms; upper and lower halls 8 feet wide. An L kitchen, 16 by 24, one story, with hall 6 feet wide.

A common stable, 8 stalls, a corn crib and cow shed. Stable 36 by 36. 10 foot stable, on north side for hay and corn. 16 feet center cow shed, on south side 15 feet.

J. Balsiger.—My buildings are of the most common kinds, *i. e.* some of frame and some of logs. I think brick buildings for dwellings, as well as for stables, preferable, more durable, and both warmer in winter and cooler in summer.

18. FENCES.—Material preferred: cost per rod, and cost of keeping up hedge, board and rail fences: value of hedges for protection: is it cheaper to fence out stock than to keep them up?

F. Moss.—Osage for hedge is thought most desirable. Fence stock in. Not allowed at large.

M. A. McConnell.—We think pine boards and burr oak posts preferable to anything else, and the cost is about as follows, per rod:

2 burr oak posts, 15 cents each	.30
34 feet boards, at 2 cents per foot	.68
1 lb. nails	.06½
Making	.15½
Total per rod	$1.20

Hedges do not do well in this climate. The winters are too cold, and they freeze down; but if they could be grown as they can farther south, they would be a great protection to stock, and very much cheaper than any other fence.

H. Pierce.—Osage orange costs $1 per rod for making a good stock fence. The cost of keeping up a post and board fence for 10 years averages 25 cents per rod, and then it must be renewed almost entirely.

Hedges are much used around orchards, and are valued highly as a protection. My opinion, after a careful calculation of the land that is occupied by fences around a farm, and cross fences, wear and waste, is, that it would be far cheaper to keep cattle up, though, as yet, we have a large lot of land unoccupied, upon which the large cattle owners pasture their stock, to the manifest injury of the poorer man, who must fence them *out at a first cost* of not less $2 per rod, and then some fine morning wake up and find

his fields of wheat or corn destroyed by from 50 to 500 cattle filling themselves and trampling down the remainder; and no recourse left but to pocket the loss with as good a grace as he can.

J. Tefft.—For road fence we prefer wire, as it turns unruly stock better than board fence. Costs about 50 cents per rod when well made.

C. E. Barney.—Quaking asp poles, cut, split and peeled in summer, nailed on good, seasoned posts, make a light and very strong fence. Cut eight feet long.

I think, if no stock was allowed to roam in the roads and lanes, people would have better stock, take better care of it, and make more money on it.

V. Aldrich.—Fences here mostly made of rails, called the Virginia fence. The staked and ridered fence, where timber is plenty, is the best. In this locality the post fence, with rails or boards, is fast taking the place of the old worm fence. Either of them will cost from $1 to 1 25 per rod.

Osage hedge, properly made, I prefer to all other fence. The plants cost from 62 1-2 to 75 cents per rod. It will require four or five years growth to make a substantial fence. I formerly cut it back each year, but now prefer to let it grow as fast as possible, until large as fork stobs—10 or 12 feet high, or more, then lop it by cutting each one about half off near the ground, laying it in an angle that will make the top high enough for the fence. It will sprout up through this and become very thick and still retain life in the main lopped stem.

When I desire wind-breaks I let them grow their own way after lopping; prune other places to suit. The cost of a hedge is less than keeping up other fences.

I am greatly in favor of keeping up stock. Which is cheapest, to fence in or out? I don't know, but believe least trouble to arise from fencing in.

A. Rankin.—I think Osage orange is the best material for fencing. The next best is made by using large, round cedar posts, with three boards and three wires; costing about $1 60 per rod.

It is decidedly cheaper to put up stock than to fence them out.

G. W. Minier.—Osage orange hedge every time and all the time. Mine, completed, cost just twenty-five cents per rod. Board and rail fences will soon be obsolete. We can hardly estimate the value of hedge as a wind-break and modifier of our bleak climate.

"Is it cheaper to fence out stock than to keep them up?" Yes; by at least fifty per cent.

T. Gregg.—"All sorts" of fences abound. White oak posts and pine lumber are very extensively used as a first fence, both on the prairie and on the bluffs. The Osage orange succeeds well and is being planted in great quantity. It is believed to be the best material for live fences for this region, and will have to be generally resorted to. That earlier planted has, however, been much neglected; so that it is a rare thing to see a really good and beautiful live fence in the country. But the slovenly habits of our people are gradually yielding to the influence of better teachings, and there is a marked improvement taking place.

A. C. Hammond.—The Osage orange is the cheapest, best and most durable fence. It can be planted, cultivated and trained until it forms a perfect fence, for 50 cents per rod, and afterwards annually pruned for 5 cents per rod. A board fence cannot be built for less than $1 25 per rod, and I find the expense of keeping it in repair greater than that of trimming the hedge. When properly pruned a hedge is of little value for protection.

If the farmers of Illinois were to keep their stock up, instead of fencing it out, it would undoubtedly add hundreds of thousands of dollars annually to their pockets.

W. A. Allen.—Hedges preferred for fencing. Cost now, $1 per rod. Keeping hedge trimmed costs $8 per mile per year. Keeping up a board fence costs nearly all your

time, besides boards and nails. Hedge for protection is very good, but does not equal the grey willow.

It is cheaper to fence stock in.

S. P. Boardman.—In the way of fencing, public interest in Central Illinois is now entirely concentered on hedge. Since the discovery and practice of plashing has come about, there are but few doubters as to the complete efficiency of the Osage hedge. Many of the old hedges (rather attempts at hedges) which were considered not only failures but nuisances, have been made, by plashing, to turn all kinds of stock.

G. Harding.—My experience is in favor of a live hedge fence of the Osage orange. It gives shelter to stock; is a good wind-break, and an everlasting and effectual fence, at a cost of 60 cents per rod, when large enough to turn stock, and an annual cost of two cents per rod to keep the same in repair.

I consider it cheaper to fence out stock than to keep it up.

The Osage is best for a live fence. If managed rightly, it will turn any kind of stock in 3 or 4 years from re-setting in the hedge row. We have no machines for cutting hedges. The plan I have followed for preparing ground, setting, tending and trimming plants, is this: Prepare the ground in the fall, then break deep in the spring by throwing together several furrows. Run one furrow in the centre, set the plants in it eight inches apart, then cover the root to the same depth as in the nursery. If the ground is rough or cloddy, roll or harrow, or both. Plow well with the double shovel and hoe them well for the first and second years, then use the turning plow. If good-sized plants the first year, they may be plowed the second by the turning plow. I find a ditch on either side the hedge essential, to make the roots strike downward and not spread when the plow runs near them. If there is no ditch the roots will be broken by the plow and then sprout and spread. If the land is not tilled the ditch is unnecessary. If made at all it should be finished by the third year. I do not trim hedges until the third year, when, if of sufficient size, I cut the plants half off and bend them down along the row. The young shoots will again start where the plant is cut off, and when cut form the height of the fence, while the ones bent down stop all holes. If not well trimmed the young shoots will shade those bent down so much as to cause decay. The cost of hedge fence varies according to its width and the manner in which it is tended. As I set them it takes 2,000 to 80 rods, costing near here $2 50 per thousand, making $5 to 80 rods. The labor of setting, etc., about $6. Therefore it will cost about 20 cents per rod for setting hedge, including cost of plants. After being set it will cost 20 cents per rod to till and trim the hedge, which should be trimmed once or twice each year after the 3d or 4th year. With machines there would be little expense in keeping up the hedge once well started. I prefer rails for cross fences, as they are often moved. A rail fence costs at least $1 25 per rod, if made out of good rails, such as oak, ash, walnut and red elm. A board fence costs $1 35 or $1 40 per rod, if of oak; more if of pine lumber. Where one is fencing against cattle and horses only, a three-board fence will answer, and will last until a hedge fence can be made. Hedge fences are the cheapest the farmer can have, and afford good protection to stock and fruit. Orchard trees are much less liable to blow down when a hedge protects them from the wind.

I think and am sure that in any part of the country where the land is not fenced, it would be much cheaper to fence for pasture to keep stock in, than to fence the whole of the land in order to keep stock out of the farms.

S. Butler.—Rail fence costs $5 per hundred.

We, as a general thing, fence out stock, and keep it up if we choose.

D. Gove.—I have tried all kinds of wooden fences, and at best they require a great deal of repairing to make them safe. I have also had considerable experience in hedging; and it is just the fence for this prairie country. It will cost less to make it and keep it in repair than any other fence, and it bids defiance to high winds or any kind of stock. It can be made sufficiently strong to turn any kind of stock for 75 cents per rod, and can be

:ept in order for 10 cents per rod per annum; and if the wind blows your fence is in no langer; which is quite an item.

"As to fencing stock out or in," my theory is, to fence them in. If I own stock is it ot just that I should keep them where they cannot injure my neighbor, who has no tock?

J. G. Swann.—Eight rails high. Black and white oak. Staked and ridered. Costs 5 cents per rod. Stock kept up.

E. A. Reihl.—It is much cheaper to fence stock in than to fence out.

J. Balsiger.—My fences are the common rail fence. Having plenty of timber, and not › much capital at my disposal, these were more convenient for me than board fences. ut I am now beginning to plant Osage orange hedges, believing them to be, when well ised and cared for, the most lasting and the cheapest fence; and requiring, when once rown, the least labor to keep it in order; and, moreover, serving as sheler belts against ie blasting winds. We have in this neighborhood, many, I dare say, perfect hedges of sage orange.

I think it more advantageous to keep up stock than to let it run at large; though I now that fences, and keeping them in order, are a heavy charge on the farmer, as well r the work they demand, as for the timber they consume, especially rail fences, while ›ard fences are very expensive.

J. Y. Bothwell.—I have half a mile of Osage orange hedge. It is good. I set the plants 3 or 20 inches apart, and cultivate well until they are from an inch to an inch and a uarter in diameter; then lay them down close to the ground. In April, confine them iere by laying rails or poles on them. In July, remove the rails or poles. In one year ie fence will turn any decent animal, and in another year it will turn anything. I also ave two miles of plank fence, made as follows: Split white oak posts, split square, 7 1-2 et long; set them top end of timber down. Use post augur 8 inches in diameter. Set he posts 5 feet apart. Use white oak plank 15 feet long, 1 inch by 4; use one nail and ix planks to the panel. It makes a good tight fence, and costs $2 per rod here, where it s cheaper than a rail fence, as timber is cheap. The balance of my fencing, 5 1-2 miles, s made of rails, but I shall make no more such. The hedge is *the* fence; when it cannot e used, the style of plank fence I have described is the cheapest and best I have found. do not trim my hedge at all, as I consider it time thrown away, and injurious to the ealth of the fence. Let it grow; it will not get very high, and if it should, 'twill make good wind-break against the cold prairie winds. As for side trimming, it does not become very wide, the growth is chiefly upward.

T. Engelmann.—The old worm-fence is slowly disappearing and plank fence taking its lace. The cost of constructing a plank fence in this locality is about $1 85 per rod, o-wit:

Two white oak or overcup posts, 25 cents each	$ .50
Forty feet fencing at $30 per 1,000 feet	1.20
Nails and labor	.15
Total	$1.85

Osage orange hedges have been tried to some extent. With proper care they may afford sufficient protection, but on an average they have failed to give satisfaction.

The land in St. Clair county being nearly all in cultivation—all, except comparatively small bodies of it in the river and creek bottoms—so that in a few localities only, the stock which was running at large was able to maintain a poor existence for a few months of the year, on the so-called common pasture. It has for many years back been a fact, well understood by all farmers, that the benefit derived from that pasture was insignificant in comparison to the costs of making and keeping up fences, and efforts have been made to compel the owners of stock, by legal enactment, to keep up the same; but they have always been defeated *by the opposition of* persons who own no land, or only small

tracts of it, principally by the residents of towns and villages, until last fall, when a law to that effect was again submitted to the vote of the people, with a proviso, that in any election precinct in which the law would receive a majority of votes, it should be in force. In this way some of the election precincts have adopted the law, which went in force on the first of March, 1863; while in other and adjoining precincts the law has been defeated. It is to be seen how it will operate.

19. Capital, per acre, required for good farming?

H. Pierce.—About $40 to $50 at present rates of fencing. Without having to fence more than was required for his own stock, $20 to $30 per acre. Basis of calculation, a farm of 160 acres. One could farm with a much smaller capital, but I estimated the cost of stock, etc.

C. E. Barney.—As to the capital required for good farming, $12 per acre would be very desirable—some brains, and the ability to apply them to the soil, would be indispensable.

A. Rankin.—It costs about $10 per acre for good farming here; that is, for grain. Root crops cost more. I last year spent $41 on an acre of potatoes, and got 241 bushels, which I sold for $1 per bushel.

G. W. Minier.—$10 per acre is none too much.

G. W. Vaughan.—It costs at least $5 or $6 per acre to farm land as it should be, exclusive of manures.

D. Gove.—With our mixed husbandry it takes about $10 per acre per annum, to pay all expenses.

J. G. Swann.—$6 per acre.

E. A. Riehl.—I have 160 acres; 40 cleared, and have $10,000 invested (besides cost of land), and twice that amount would be more profitable.

J. Balsiger.—I think that for good farming an available capital of nearly the same amount as the value of the land, would not be too much, though this depends on whether the land is already in cultivation, good order, etc.

G. C. Eisenmeyer.—Good farming land in this section of St. Clair county, is worth from $80 to $115 per acre. I know of no farm cultivated by hired labor owners, who have not sufficient force within their own families to cultivate their farms, find it to their interest, since wages are so high, to lease out their farms to tenants, receiving one-third of the crop as rent. Land is in great demand at this rate, and hired labor is generally employed only in harvest time. For these reasons it is difficult to make an estimate of the capital required for good farming.

AGRICULTURE AND THE MECHANIC ARTS IN THE EARLY DAYS OF ILLINOIS.

It may be a matter of interest to review, so far as we can, the history and progress of Agriculture and the Mechanic Arts in Illinois, from its first discovery up to the year 1830, or about a generation since.

The value of the "Illinois country" as an agricultural district was early noted by the French missionaries. In the narrative of Father Marquette, who descended the Mississippi in 1673, we find it stated of the Indians at the mouth of the DesMoines, who were probably identical with those of our own State, at least in their agriculture: that "they live by game, which is abundant in this country, and on Indian corn, of which they always gather a good crop, so that they have never suffered by famine. They also sow beans and melons, which are excellent, especially those with a red seed. Their squashes are not of the best: they dry them in the sun, to eat in the winter and spring." Father Allouez, in 1676, says of the "Kach-kach-kia" Indians—"they live on Indian corn and other fruits of the earth, which they cultivate on the prairies, like other Indians. They eat fourteen kinds of roots, which they find in the prairies; they made me eat them: I found them good and very sweet. They gather, on trees or plants, fruits of forty-two different kinds, which are excellent. They catch twenty-five kinds of fish, including eels. They hunt cattle, deer, turkeys, cats, a kind of tiger, and other animals, of which they reckon twenty-two kinds, and forty kinds of game and birds." "It is the custom of these tribes," says Father Membre, 1679, "to put their Indian corn in caches, in order to keep it for summer, when meat easily spoils, and to go and pass the winter in hunting wild cattle and beaver, *carrying very little grain.*" "The richness and

fertility of the country," he adds in another place, "gives them fields everywhere." In 1680, he informs us: "As wine failed us for the celebration of the divine mysteries, we found means, toward the close of August, to get wild grapes which began to ripen, and we made very good wine, which served us to say mass till the second disaster, which happened a few days later. The clusters of these grapes are of prodigious size, of very agreeable taste, and have seeds larger than those of Europe."

Charlevoix, who went down the Mississippi in 1721, has a few pertinent remarks to make upon the natural resources of Illinois. Being just below the present town of LaSalle, on the Illinois river, he says:

"The largest of these [rivers] is called *Pisticoni*, and proceeds from the fine country of the *Mascotins*. At its mouth is a fall, or a rapid stream, which is called *le Charboinere*, or the *Coal-pit*, from the great quantity of sea coal found in the placers adjacent."

Writing from Kaskaskia, he adds:

"The soil is not only extremely proper for wheat, but besides, refuses nothing necessary or useful for human life. The climate is extremely temperate, lying in thirty-eight degrees thirty-nine minutes north latitude. Cattle and sheep would multiply here wonderfully. Even the wild buffaloes might be tamed, and great advantages drawn from a trade of their wool and hides, and from their supplying the inhabitants with food."

"The highlands, and other kinds of soil not liable to be overflowed by the river, are even already very well adapted for producing corn, and if the trials made in some places have not succeeded because the corn has been blasted or mildewed, it is owing to this circumstance, that the country not being cleared, the wind has not free access to disperse those noxious vapors which generate mildews. An evident proof of which may be drawn from this: that amongst the Illinois, where there is more meadow than woodland, wheat thrives and ripens as well as in France."

"The French in this place live pretty much at their ease. A Fleming who was a domestic of the Jesuits has taught them to sow wheat, which succeeds very well. They have black cattle and poultry. The Illinois, on their part, manure the ground after their fashion, and are very laborious. They likewise bring up poultry which they sell to the French. Their women are very neat-handed and industrious. They spin the wool of the buffalo, which they make as fine as that of the English sheep: nay, sometimes it might even be mistaken for silk. Of this they manufacture stuffs which are died black, yellow, or a deep red. Of these stuffs they make robes which they sew with thread made of the sinews of the roe-buck. The manner of making this thread is very simple. After stripping the flesh from the sinews of the roe-buck, they expose them to the sun for the space of two days; after they are dry they beat them, and then without difficulty draw out a thread as white and as fine as that of Mechlin, but much stronger."

Charlevoix notices, as productions of Illinois, white mulberries, *acane* (pecans), *Piakimine* (persimmon), and the cane.

Du Pratz, in 1758, wrote a description of Louisiana, from which take the following extracts, following the translation of 1774:

"The country of the Illinois is extremely good, and abounds with buffalo and ier game. On the north of the Wabache we begin to see the Orignaux, a species animals which are said to partake of the buffalo and the stag. They have indeed en described to me to be much more clumsy than the stag. Their horns have mething of the stag, but are shorter and more massy. The meat of them, as they y, is pretty good. Swans and other water fowl are common in these countries."

"The French post of the Illinois is, of all the colony, that in which, with the eatest ease, they grow wheat, rye and other like grain, for the sowing of which u need only to turn the earth in the slightest manner; that slight culture is suffi- ent to make the earth produce as much as we can reasonably desire. I have been sured that in the last war, when the flour from France was scarce. the Illinois sent wn to New Orleans upwards of eight hundred thousand weight thereof in one nter. Tobacco also thrives there, but comes to maturity with difficulty. All the ants transported thither from France succeed well, as do also the fruits."

He describes the culture of maize, water melons, tobacco, pota- oes, etc., but evidently with reference to the lower part of the alley of the Mississippi.

Pittman, an English captain, who came along the Mississippi bout 1770, on a mission of the British government, which cquired this country from the French a little earlier, describes everal of the French posts below St. Louis and along the Ameri- an Bottom, in the following language:

"The inhabitants here [La Prairie de Rochér] are very industrious, and raise a reat deal of corn and every kind of stock."

[Saint Philippe.] "The captain of militia has about twenty slaves, a good stock f cattle and planks."

[Kaoquias—Cahokia.] "The inhabitants of this place depend more on hunting nd their Indian trade, than on agriculture, as they scarcely raise corn enough for ieir own consumption. They have a great deal of poultry and good stocks of orned cattle. "The Mission of St. Sulpice" disposed of thirty negroes and a good ock of cattle."

"The soil of this country in general is very rich and luxuriant. It produces all rts of European grains, hops, hemp, flax, cotton and tobacco, and European uits come to great perfection. The inhabitants make wine of the wild grapes, hich is very inebriating, and is in color and taste very like the red wine of Pro- ence."

"In the late war, New Orleans and the lower parts of Louisiana, were supplied ith flour, beer, wines, hams, and other provisions from this country. At present s commerce is mostly confined to the peltry and furs, etc.

"The price of labor in general is very high, as most of the young men rather hose to hunt and *trade among the Indians*, than apply to agriculture or become

handicrafts. At the Illinois a man may be boarded and lodged the year round, on condition of his working two months, one month in ploughing the land, and sowing the corn, and one month in the harvest."

"Mons. Paget was the first who introduced water-mills in this country, and he constructed a very fine one on the river Cascasquias, which was both for grinding corn and sawing boards. It lies about one mile from the village [of Notre Dame de Cascasquias]. The mill proved fatal to him, being killed as he was working in it, with two negroes, by a party of the Cherokees, in the year 1764."

He farther mentions:

At Saint Phillipe, "a water-mill for corn and planks."

At Kaoquias, "a very good mill for corn and planks."

"The only trades they have amongst them are carpenters, smiths, masons, taylors, and mill-wrights."

"The air in general is pure, and the sky serene, except in the month of March and the latter part of September, when there are heavy rains and hard gales of wind. The months of May, June, July and August are excessive hot, and subject to sudden and violent storms. January and February are extremely cold. The other months of the year are moderate."

"The country abounds with buffalo, deer, and wild fowl, particularly ducks, geese, swans, turkies and pheasants. The rivers and lakes afford plenty of fish."

In the "Western Annals" we find a good description of the original method of laying out farm lands under French rule:

"The style of agriculture in all the French settlements was simple. Both the Spanish and French governments, in forming settlements on the Mississippi, had special regard to convenience of social intercourse, and protection from the Indians. All their settlements were required to be in the form of villages or towns, and lots of a convenient size for a door yard, garden and stable yard, were provided for each family. To each village were granted two tracts of land at convenient distances, for '*common fields*' and '*commons*.'"

"A common field is a tract of land of several hundred acres, inclosed in common by all the villagers, each person furnishing his proportion of labor, and each family possessing individual interest in a portion of the field, marked off and bounded from the rest. Ordinances were made to regulate the repairs of fences, the time of excluding cattle in the spring, and the time of gathering the crop and opening the field for the range of cattle in the fall. Each plat of ground in the common field was owned in fee simple by the person to whom granted, subject to sale and conveyance, the same as any landed property.

"A common, is a tract of land granted to the town for wood and pasturage, in which each owner of a village lot has a common, but not an individual, right. In some cases this tract embraced several thousand acres."

Gov. Reynolds, in his Life and Times, gives a more minute and graphic account, extending to a later period:

"The agriculture at this period (1800) was limited and inefficient. The citizens *were generally poor*, and raised not much surplus produce. At this period there

was neither barley, rye, nor oats, cultivated in the country. Corn, wheat, and potatoes were then, as they are now, staple articles.

"The Americans cultivated the same species of corn they do now, but the French almost entirely raised the hard, flinty corn, out of which hominy was manufactured. They also sowed spring wheat, as their common fields were occupied by the cattle all winter. The Americans mostly raised fall wheat, and at times some spring wheat also.

"In early times the French cultivated only a scanty supply of potatoes, or other vegetables, except articles pertaining to the gardens.

"In horticulture they excelled the Americans. The lettuce, peas, beans, carrots, and similar vegetables, were cultivated considerably in the French gardens. In this necessary branch of culture the pioneer Americans did not rival their French neighbors; but in a "truck patch" the Anglo-Saxons surpassed the other race. Cabbages were, to some extent, cultivated, but sweet potatoes then were not seen in the country. In early times flax and cotton were cultivated considerably. Large stocks of cattle, horses and hogs were raised in proportion to the number of inhabitants. The French cart was a primitive vehicle made entirely of wood, and not an atom of iron in its construction. Running it without grease it made a squeaking noise which could be heard at a great distance. At this early day the agricultural implements were defective. The old bar-share plough was used by the Americans, and sometimes the shovel plough, in the growing corn. The common hoe was the same then that is used at this day. [?]

"The French depended more on hunting and voyaging for a living than on agriculture, and therefore paid less attention to the cultivation of the earth. Their ploughs, and they had but one class of that instrument, was of French descent, I presume, as I saw the same species of plows in old France. The French plow was destitute of iron, except a small piece, and the same fastened to the point of the wood of the instrument, to cut the earth. The metal was tied with raw-hide to the wood of the plough, and also a kind of mortise was made in the fore part of the share, in which the front of the wood was inserted. The bar, as it is called, was constructed of wood. The handles were very short and crooked, so that the ploughman walked almost on his plough. The beam was straight, and laid on the axle of a low-wheeled carriage. The wheels of this vehicle were low and made without iron, similar to the wheels of a wheel-barrow. Holes in the beam of the plow permitted the instrument to be so regulated on the axle, that it would make the proper depth of furrow. The plow was dragged on generally by oxen. The cattle were tied to the plow by a straight yoke, which was tied to the horns of the oxen by straps of untanned leather.

"Some few grist mills were established in the country in 1800, and one saw mill. General Edgar had erected a fine flouring mill on a small stream passing through the Mississippi bluff, a short distance northeast of Kaskaskia, which did considerable business for two-thirds of the year. This mill manufactured flour for the New Orleans market, and frequently boats were freighted from this mill with the flour to the southern market.

"Henry Levens had in operation at this date the only saw mill in the country. It was built on Horse creek, a few miles from the mouth of the creek, in Randolph county.

"Judy owned a water mill situated a few miles south of Columbia, in the present county of Monroe. West of this mill and near the Mississippi bluff, Valentine

owned a small water mill for many years. In Prairie du Pont, Jean F. Perry owned a water mill for many years. This was the same site where the Jesuits had erected a mill some forty or fifty years previous. Joseph Kinney had a small water mill on a stream east of the New Design. In all the French villages, and in the New Design also, horse mills were erected, and some business done by them when the water mills were dry."

In his Pioneer History, Gov. Reynolds says:

The custom among the inhabitants of the Illinois villages in regard to making and keeping in repair the fence of this common field, was that each proprietor of land should make and keep in repair the fence passing over his land. And if a tract of land was abandoned by its owner, as was the case sometimes, the land was sold out at the church door to any one who would make the fence to enclose it. [These sales, I believe, took place on Sunday, after high mass.]

The French system required the grants to be adjacent to each other, and numbered; so that no intervening tracts could exist. The grants were generally made by so many *arpens* in front, and extending at right angles to the requisite quantity. The lines were not, like the lands of the United States, run on the cardinal points, but were run the same course and frequently the same length. Generally, the French grants in Illinois commenced at the river and extended to the bluff, or from river to river, as they are at Kaskaskia. A French acre or *arpent* is eleven rods and sixty-seven hundredths of a rod, English measure, being the square of the *arpent*. This system contemplated either large enclosures, embracing the lands of many farmers, or the fields cultivated without fencing. It would be too expensive for a farmer having a grant of one *arpent* in front, 11 67-100 rods, and running, perhaps, many miles the other way, as they do in the Cahokia common field, to fence his farm himself. And, in consequence of this system, the French of the villages had, in olden times, their whole common field enclosed together. The fence generally extended, near the villages, from either the Mississippi to the bluff, or from the Mississippi to the Kaskaskia, as it was at Kaskaskia. The common field was on one side of this fence, and the stock, cattle, horses, hogs, etc., were forced to range on the other side. This was the ancient manner of enclosing the common fields of Kaskaskia and Cahokia for nearly one hundred years, and the same system was adopted by all the other villages of Illinois. A large gate was erected in the fence near the village, and a keeper was stationed at it, to permit the farmers and others to enter the field and return at pleasure.

In the fall, when the corn and other crops were gathered, the gate was thrown open and the stock took possession of the field during the winter.

Grants of land were made for almost all, or entirely so, of the American bottom from the upper limits of the common field of St. Phillips to the lower line of the Kaskaskia common field, a distance of nearly thirty miles; and the traces of cultivation could be distinctly discerned in the greater portion of this tract of country down to the year 1800, and after.

In the early settlement of the country, the horned cattle came from Canada and the horses reached the country from the South and the West. The cattle were a hardy race, not large but of neat formation. The horses were of the Arabian strain. The Spaniards introduced them into their American possessions, and from this race *originated the* French horses. This blood of horses was brought into Spain from

Arabia, by the Moors. These French horses were small, but performed better, to their size, than any others.

The primitive French had no tanned leather for any purpose whatever. They made harness out of raw hide, which was strong but rough. They had the traces for their horses plaited of small strands of raw hide, so that they were round and neat. These traces were very strong, and such are used to this day in France.

In the fall of 1745, a destructive storm visited lower Louisiana, and destroyed almost all the crops. But the Illinois and Wabash settlements relieved them. Boats descended in the fall, and returned early in the spring. It is stated that four thousand sacks of flour were sent this fall to the lower Mississippi from Illinois alone. These sacks weighed 100 pounds each, and were made of deer skins.

Cotton was introduced into both Louisiana and Illinois about the year 1750. Tobacco was also cultivated at Baton Rouge, Natchez and Illinois. The French houses were generally one story high, and made of wood. Some few were built of stone. There was not a brick house in the country for one hundred or more years from the first settlement. These houses were formed of large posts or timbers; the posts being set three or four feet apart, in many of them. In others, the posts were closer together, and the intervals were filled up with mortar made of common clay and cut straw. The mortar filled up the cracks, so that the wall was even and regular. Over the whole wall, outside and inside, it was generally whitewashed with fine white lime, so that these houses presented a clean, neat appearance. The other class of houses, having the posts farther apart, the spaces were filled up with puncheons; the posts were guttered for the puncheons to fit in. These houses were used for barns, stables, etc., etc. Some dwelling houses and the stables and barns were made of longer posts set in the ground, instead of a sill, as was used in the other houses. These posts were of cedar or other durable wood. The small houses attached to the residence, were generally set with the posts in the ground. The covering of the houses, stables, etc., was generally of straw, or long grass cut in the prairie. These thatched roofs looked well and lasted longer than shingles. They were made steep and neat. All the houses, almost, had galleries all around them. The posts of the gallery were generally of cedar or mulberry.

The floors of the galleries, as well as the floors of the houses, were made of puncheons, as sawed boards were scarce. The roofs of the dwelling houses were uniform and peculiar. They were made of rafters and lath for sheeting. These roofs had no gable ends perpendicular, but were shingled on the ends as well as the sides. The end sloped considerably towards the center of the building, so that the shingles would lie on the lath. No nails were used to fasten the shingles to the lath. Holes were bored in the shingles and pegs put in them; with these pegs the shingles were hung on the lath, and the holes and pegs covered so completely that no one would know at a distance that the shingles were not nailed on. The outside course of shingles was generally nailed, and then one course bound another, until the whole roof was solid and good; never leaking one drop. The shingles were generally made of white oak, and lasted for many years. On the comb of the roof, a cross of wood was often placed, that also lasted a long time.

The doors were plain batten work, out of walnut, mostly. The windows had, generally, some glass in them, and the sash opened and shut on hinges, as the French fashion is generally. The houses were mostly raised from the earth, a foot or two, on a stone wall. The French, in these their happy days, had clean wells, nicely

walled with rock, and a windlass fixed to them; so that water was convenient and clean.

In the first settlement of the country the inhabitants were in great distress for want of salt; but they discovered, in the present county of Gallatin salt springs, which were much used by the Indians and French of Vincennes. From the first settlement of the Wabash by the French, for nearly one hundred years after, much salt was made out of the water of these springs and conveyed to Vincennes.

Salt water, in modern times, has been discovered in many places in Illinois. On Big Muddy river, quantities were manufactured by Conrad Will, and others. Judge Biggs made salt in Madison county, on Silver Creek; and in Bond county, on Shoal Creek, salt was also manufactured.

General Edgar owned the works and manufactured salt many years at a saline in Monroe county, at the Mississippi bluff.

In Vermilion county, salt water was discovered, and salt manufactured by Mr. Vance. This gentleman bored into the rock, for salt water, to the depth of 400 or 500 feet.

In very early times, very little intoxicating liquor, if any at all, was introduced into the country. Indian traders may have had small quantities, but so small that it was scarcely noticed. In after times, a liquor from New Orleans, called "Taffia," was brought to Illinois. This was manufactured out of sugar or sugar cane, in the West India Islands, and resembled New England rum. Some considerable wine was manufactured out of the native grapes. This wine was made by the first settlers, but disappeared with the Europeans. The Creoles made little or none.

In the pioneer times of Illinois, the mechanic arts did not flourish; mason work of that day was good, but of the rest I can say nothing in praise of them. The cooperage of the country amounted to very little more than making well-buckets. The carpenters were unskillful in their profession. They framed houses and covered them with peg shingles; made batten doors, etc., in a rough fashion. No shoemakers or tanners, but all dressed deer skins and mawkawsins. Almost every inhabitant manufactured his own cart and plow, and made his harness, traces and all, out of raw hides. * * There was neither spinning wheels or looms in the land.

At that day, the sickles or reap hooks were the only implements used to cut wheat.

There were no cradles in the country to cut the small grain, and the late improvements made their appearance, to harvest the grain, fifty years afterwards. [This must refer to the reaper and header. The grain cradle was introduced about 1830.] Reaping with the sickle was a severe labor. Wheat at that day sold for a dollar per bushel.

Mowing the prairie grass was, as well as reaping wheat, a hot, hard labor—but a short distance from the farms, in the prairie or in the timber, in places, good grass was selected and mowed. * * * * *

The Americans, at that day, generally stacked their hay and wheat out, but the French had barns in which they housed their wheat and hay.

The French barns were made of large cedar posts put in the ground some two feet, and set apart four or five feet; the space between the posts was filled up with puncheons put in grooves in the posts, and the whole covered with a thatched roof.

It was a great trouble in olden times to thresh and clean the wheat. The Americans used horses, at times, to tread it out. About the hardest work I ever performed *was winnowing* the wheat with a sheet.

Considerable quantities of corn were shipped from Illinois in flat boats to New Orleans, before the purchase of Louisiana. It was an uncertain market and a more uncertain navigation of the river. Some considerable stock, cattle and hogs were raised for the market; some were shipped to New Orleans, and considerable live stock to the lead mines in Louisiana. The commerce on the river and the Indian trade consumed some of the small surplus products of the farms.

Irish potatoes were raised in abundance in pioneer times in Illinois, and the crops scarcely ever failed.

Only small quantities of cheese or butter were manufactured—scarcely enough for home consumption.

The French scarcely ever troubled themselves with milking cows, but turned the calves out with the other cattle, and made little or no butter. They scarcely ever used a churn, a loom or a wheel. At this early day, both the French and Americans possessed large apple orchards, in proportion to the number of people in the country. The French also cultivated considerable orchards of pears, but the peach tree was almost entirely neglected. In after days, peaches, apricots and other fruit were raised in abundance.

The band mill was so called because a raw hide band, twisted, was put on the large wheel in the place of cogs; it saved the gearing of the mill. They are the lowest and cheapest order of horse mills. Pins are put in the arms of the large wheel, and around them the band is placed. These pins may be changed into holes made for the purpose, so the band may be made tighter when necessary.

The next is the hand mill. The stones are smaller than those of the horse mill, and propelled by man or woman power. A hole is made in the upper stone and a staff of wood is put in it, and the other end of the staff is put through a hole in a plank above, so that the whole is free to act. One or two persons take hold of this staff and turn the upper stone with as much velocity as possible. An eye is made in the upper stone, through which the corn is put into the mill, with the hand in small quantities, to suit the mill, instead of a hopper. This is a hand mill. A mortar wherein corn is beat into meal, is made out of a large, round log, three or four feet long. One end is cut or burnt out so as to hold a peck of corn, more or less, according to circumstances. This mortar is set one end on the ground and the other up, to hold the corn. A sweep is prepared over the mortar, so that the spring of the pole raises the piston [pestle?] and the hands at it force it so hard down on the corn, that after much beating, meal is manufactured.

The last and lowest order of inventions to manufacture meal is a grater. A plate of tin is pierced with many holes, so that one side is made very rough. The tin is made oval, and then nailed to a board. An ear of corn is rubbed hard on this grater whereby the meal is forced through the holes, and falls down into a vessel prepared to receive it.

Agriculture assumed [1818] a better standing and efficiency than heretofore. The horse tracks were converted into corn fields, and the rifle exchanged for the plow; hunting was abandoned, and churches, school houses and civilization took their places. The farmer commenced to raise stock for exportation. Hogs and cattle grew in the river bottoms without much care or expense, and yielded a rich reward to the husbandman. Horses were also raised for exportation, and money flowed into the country through these various channels to repay many fold the farmer. The country was new, and the range was excellent; so that stock was raised, as above

stated, without much expense or trouble. The Ohio drovers expended considerable money in the country for cattle.

Colonel William Whiteside, in the year 1796, introduced into the country a fine blooded horse, of the Janus stock. It is supposed, by the best judges of horses, that a better horse was never since stood in Illinois. Many of his colts made turf nags that won races, not only in Illinois, but in many parts of the Union.

All along the Ohio river, and up the Mississippi to Muddy river, and sometimes higher, the cane grew so thick and strong that man or beast could scarcely penetrate it. These were called brakes, and were so thick and matted together, that deer, buffalo, horses and other animals were completely housed and sheltered from the storms. Hunters say they have often heard buffaloes, in the winter, bellowing in these cane brakes, as if it were summer in the prairies.

Above the cane regions, the rushes grew on the sandy margins of the Mississippi and on sandy islands, strong and thick. They are more nutritious and better on which to winter animals than cane.

Morris Biebeck, who wrote letters from Illinois in 1819, gives us some idea of farm matters over on the Wabash at that early day. He settled in Edwards county. Horses, he says, were worth sixty to one hundred dollars; cows, ten to twenty; sows, three to five dollars.

Mechanics' wages were one dollar to one dollar and a half per day; maple sugar twenty-five cents per pound; coffee forty cents; sugar twenty-two to twenty-four cents, and tea two dollars and fifty cents.

He gives us a little horticultural information also:

The wild grapes of this country are pleasant enough to invite us to introduce better, and denote a climate well adapted to the vine. The crab is inferior in size and flavor to ours in England; yet the cultivated apple exceeds anything I have seen. In proof of the perfection which this fruit attains here, I have taken sixteen full-grown plump pippins [seeds] from one apple. Pears also succeed very well. The peach bears fruit the third year from the stone; but the trees are short-lived, and liable to blight. We have gooseberries and currants in perfection; and in general, the vegetable productions of our old country that have been introduced here are improved by the change.

Woods, an Englishman who followed Biebeck to the Wabash wilderness, wrote a book on that part of the "Illinois country," which was published in 1822, and contains a good deal of curious information on the state of agriculture at that period:

Most of the horses are of Spanish origin. They are light and clean, but not very handsome. Their coats are fine, when kept up and well cleaned, but this is seldom the case; active, but not good in the collar, being too light for heavy draught. I have bought three since my arrival, for two hundred and ten dollars. * * *

Oxen and cows are now more plentiful, but hitherto they have been fetched from *the States of* Indiana and Kentucky. They are of various sorts, but on the whole

pretty good. Some of them are handsome, and with a little care and expense an excellent breed might be raised. The price of beef from four to six cents a pound. * * * Beasts are much lighter here than in England, as their flesh is not so firm as in a colder country; the difference perhaps one-sixth or one-seventh part, in two beasts of the same size. * * * The present price of butter is twelve and a half cents, but during the winter it was twenty-five cents, and difficult to be procured. Cheese is now sixteen cents. * * * * *

The sheep of this country, and indeed of the whole of America, as far as I have seen, are mean, when compared to those of England. They are of different sorts, but much mixed. If I can judge of their origin, I think the Lincolnshire and Welsh sheep are the nearest to their original breeds; but many of them have had a little Merino blood mixed with them of late years. * * * Wool sells, on a small scale, for half a dollar a pound, without much regard to its fineness, which is the reason why sheep are higher than mutton; as a sheep of fifty pounds' weight will fetch from two dollars and fifty cents to three dollars, whereas, at five cents per pound, the very top price for mutton, the same sheep would only fetch two dollars and fifty cents. * * * * * * * *

Pigs are numerous, being easily raised. They are of various sorts, but many of them are a sandy color, and some with wattles: that is, a piece of flesh about two inches long and half an inch thick, growing out on their cheeks. They are of middling size, but from very hard keep, they do not rise to much weight. * * *

The poultry are, fowls, geese and ducks; I have seen but few turkeys or Guinea fowls. Fowls are in very great abundance, and now sell for twelve and a half cents. A dozen of eggs is generally the price of one chicken. * * *

The woods and prairies contain the following wild animals, (but there are but few of these that are most dangerous,) viz: Bears, wolves, panthers, wild cats, foxes, opossums, raccoons, ground-hogs, ground-squirrels, tree or common squirrels, deer, buffaloes, elks, beavers, otters and rabbits. * * * *

We have the following reptiles, namely: Rattle-snakes, copperheads, black, garter and water-snakes, and a great quantity of frogs in wet places, and they make a great noise in a warm evening, but in a dry season we see or hear but little of them. * * * * * * * * *

The birds are, turkeys, turkey-buzzards, prairie fowls, quails, pigeons, doves, wild geese, wild ducks, wood-cocks, snipes, black-birds, mocking-birds, red-birds, yellow-birds, humming-birds, whip-poor-wills, blue-jays, paroquets, larks, wood-peckers, black martins, and a few other small birds. But birds are not so numerous as in England. Some of them have very beautiful plumage, but not many of them are birds of song. * * * * * * * *

Prairie grass—a very coarse, strong grass; cattle are fond of it, but feeding or mowing it soon destroys it. Nimble-will—a kind of fiorin grass, or running couch grass; it springs up in land that is fed bare of prairie grass; cattle do not much like it.

Crab grass comes on ground that is cultivated, (a soft kind of meadow grass;) likely to succeed as a meadow grass for hay.

Yard grass comes on land that has been much trodden. It is something like cock's foot grass, except the seed. Horses and cattle are fond of it, and I think it will answer as a cultivated grass, as it bears drought. Buffalo clover resembles white clover, but does not run on the ground; the leaf as large as red clover. Cattle will *eat it if cut and given them*, but they are not fond of it, as I have often

seen bunches of it left where the other wild grasses have been eaten bare; the seed like clover seed, but chiefly of a pale yellow. There are a few other sorts of wild grasses, but I do not know their names; I believe they are of no great value.

Red or white clover I have not seen, but I have heard there are some small patches of the latter in the prairies. Both sorts are said to be extremely pernicious to horses, cattle and pigs. I have not seen trefoil, rye grass, saintfoin and cock's-foot, or any English grass, with the exception of a little lucern, just come up, which I think likely to succeed. Saintfoin and cock's-foot are, in my opinion, most likely to answer, and bear the heat of the climate, of any English grasses.

The grass that is most commonly cultivated here is timothy grass. It belongs to the English meadow grass, but grows here to a larger size; it does not appear to be a good pasture grass.

Blue grass is highly prized, but, as a pasture grass, is, I believe, unknown in England. It resembles young rye grass more than any other English grass; the seed is much like fiorin seed. Cattle are fond of it; it comes early in the spring, and dies early in the fall. * * * * * * *

This year, perhaps two hundred acres of wheat have been harvested in the different prairies. That which was sown in good time, and with good seed, produced a productive crop, and of good quality; but as good seed wheat was difficult to be obtained last season, many were forced to put up with such as they could procure, and some from Vincennes and Indiana turned out very bad. Those who sowed it had but little come up, and the wheat at spring being very thin on the ground, it branched out in a very extraordinary manner. I heard from several persons, to whom I think credit might be given, that in cutting a piece of wheat, they found a root that had sixty-six ears of corn on it, and that forty and upward were very common. I went over the field after the wheat was cut, and saw many of the stems of an immense size; but I did not count any of them. The wheat was, however, much too thin; it was blighted with the black and red blight, and of little value. I have been much surprised with the smallness of the quantity of wheat and oats sown per acre, and yet found the corn, (or, as it is here called, grain,) thick enough on the ground. One bushel of wheat, or two of oats, is the quantity usually sown, and I have seen wheat thus sown too thick. I suppose the dryness of the seed, newness of the land, and its kindness in working, are the causes of so much less seed being required than I have been accustomed to.

Most of the wheat sown in 1819 by the Americans was after Indian corn. It was sown before the corn was gathered, and plowed in between the rows of corn. It was sowed in September, or early in October. They sowed some after oats or flax, and for some they made fallows. That they sowed after the three last was generally better than that after Indian corn, when sown in good time. Most of the backward wheat was touched with the blight, more or less—chiefly according to its thickness on the ground. I have not heard of any being threshed for sale near us; but seventy-five cents per bushel is expected to be the price for good wheat. Most of that sown by the English was after fallows—they having, in general, no other land to sow it on. The price given this year was about 11s 3d an acre, where paid in money; but some was cut to receive three bushels of wheat per acre, and some was cut by the day. The Americans usually help each other to cut their wheat, as they are fond of company when at work. This they return at some future time in the *same way.* * * * * * * * *

ıut few oats sown, as seed was not to be procured for money for many miles; but :ink sufficient to raise seed for another year. I did not try much to get any l, as I wished to see how they succeeded, particularly on new prairie land. I e bespoke some seed for next year. The oats I have seen this year were but fferent. They were much hurt by the dry weather, and the quality of them was . I think they will never be much cultivated in this country, except it be on ' prairie land; and that for the sake of mellowing it, to prepare it for a crop of ·at or Indian corn another year.

he Americans reap and bind their oats the same as wheat, and stack them in r small stacks, without any covering. I have heard no price for oats lately, thirty-seven and a half cents was the price per bushel some time ago. Wheat begun cutting this year about the 20th of June, and oats the 26th of July. I eve no barley has yet been cultivated near us, nor have I seen any growing any re in America; but I saw some winter barley in a barn at Harmony, in Indiana, I understood some was cultivated by the Harmony Society for the purpose of :ing malt. * * * I have seen no rye or peas near us, except garden peas, ch do not grow so strong as in England, but yield well. I saw some fit to gather :he 10th of May; how early they were planted I do not know. Vegetation is :h quicker here than in England. Some peas I planted on the 1st of April were .e ripe for seed by the middle of June; and French beans were also fit for seed 'une. There was some snow and a smart frost, with scarce anything green on the of April, yet on the 6th of May there were ripe strawberries in Birk's Prairie.

'lax is cultivated, on a small scale, by most of the Americans near us, for home . It is sown in April; and after the flax is pulled, the land is often plowed and 'ed with turnips, about the end of July or the beginning of August. This year land was too dry to plow it at that time.

have seen no buckwheat at the Prairies, with the exception of about twenty s of my own. * * * * * * * *

'otton is planted in rows near four feet apart, about the end of April or the inning of May. It soon comes up, and at first looks much like buckwheat, except ; the leaves are larger, and it continues to grow much like it, only it has a larger ssom. * * * Here it seldom exceeds two feet in height. * * *

ome few Americans near us raise tobacco in small quantities for home consump- ı. * * * * * * * * *

[emp is cultivated in this country, but I have not seen any in this neighborhood, h the exception of a few rods of my own. * * * *

now come to the most important article of this country's growth. I mean ian corn, which, with the Americans, is cultivated on a far more extensive scale n anything else. * * * I have heard of one hundred and thirty-two bushels acre, but from sixty to eighty is considered a good crop. The husks that cover corn-ears, and the flags or leaves, are all good for fodder. Horses, cattle and ep all seem as fond of it as of the best hay. Horses and cattle will eat part of stalk after the corn is ripe; but in a green state, they and pigs will eat it all up. ·ses and pigs will eat the corn, and leave the cob or inside of the ear; but cattle l eat inside and all. The time of planting is from April to the middle of June; middle of May is considered the most proper season. It is planted in rows of ıt four feet in each direction; and after it is up they plow between the rows, t one way, and in a week or two in the other direction; a third plowing is some- es given to it. *An extremely light plow*, drawn by one horse, is used. Between

—26

the corn they hoe up the weeds left near the corners that escape the plow; so that the land is made very clean. Generally, two or three plants are left at each angle. Pompions are often planted at the angles with the corn, but only in every fifth or sixth row, and at some distance apart in the rows. They also plant a small kind of French bean with part of their corn, the stalks serving instead of sticks for the beans to run on.

There are several sorts of Indian corn, and of different colors, namely: white, red, yellow, mixed, etc. A small sort of yellow corn is ripe much sooner than most of the other sorts, but yields a smaller produce. White and yellow are the most common sorts, but there are several kinds of these. A good ear of corn contains from fourteen to twenty rows, and from forty to fifty grains of corn in each row. A hundred middling ears of corn will yield a bushel of clear corn. * *

The green ears are eaten boiled or roasted—the latter mostly by the Americans, who call all green ears roasting ears. The price of corn last fall was mostly fifty cents a bushel, delivered, and now fifty cents on the place; but near us there is very little to be procured at any price. On the Wabash, where the country has been longer settled, it is lower and plentiful. It is gathered in October and November, when they only take off the ears; but as the ears are covered with a large husk, they carry them as they are to the corn-crib, and then all the neighbors collect together to help to husk it, and put it into the corn-crib. This is a high day with the Americans, and is called a "husking frolic." Plenty of whisky is generally to be found at one of these frolics. * * * * * *

Pompions, or pumpkins, is another highly prized production of this country. They often grow to an immense size, and weigh from forty to sixty pounds. I have heard of a single vine that, in 1818, grew a load of pumpkins. It grew in the Big Prairie, about thirty miles to the south of us, on some rotten chaff, where some wheat had been trodden out the year before. I find they do best where the ground is moved or very mellow to run on, as they strike root at every joint as they run. * * * Cattle of all descriptions, pigs and poultry, are fond of them; but all prefer the inside and seeds to the outside. They make good sauce and excellent pies, and are much eaten here. They are sliced and dried for winter use, for pies and sauce. They will keep till the frosts come, but will soon rot when frozen. At Major Phillips', I once tasted some molasses made from them, and liked it very much—not being so sweet as the real molasses, but very pleasantly flavored.

Swede turnips are but little known here. A person who resides at Birk's Prairie sowed an acre in May, on a piece of land that had been in cultivation for two or three years; they are thin on the ground, but seem likely to be of a good size, notwithstanding the dryness of the season. They have been twice hoed, but were sown on one plowing only.

Common turnips are sometimes sown after a crop of flax—the time of sowing the beginning of August; but many of the Americans are very particular as to the age of the moon, in this and many other things; and if they should be put by in doing it, they will not do it that year, as many of them are very superstitious, having great faith with regard to the moon's age, etc. Hoeing turnips is not practiced by them.

Broom-corn: the seed is much like the seed of crop-weed. It is planted in rows on the sides of corn-fields, and is frequently plowed between. It resembles Indian corn, but it is slighter. I have seen it upward of ten feet high. * * *

We have some uncommonly fine hops in the woods, and in some of the prairies. We found them very convenient for making yeast. * * *

I have seen sun-flowers near twelve feet high, and I have heard in Ohio they plant them for the seed, from which they extract oil; and there are some in the prairies, from which turpentine distills, in the same manner as from fir trees, [rosin weed.] I have also seen growing, in some gardens near us, a plant from which an oil may be extracted like castor oil. * * * * * *

I have seen no sweet potatoes, but Irish or common potatoes grow tolerably in a wet season, but in a dry summer come to little. The early ones are planted in April, but those intended for winter use not till June. * * * They are not so good here as in England. Their present price is fifty-five cents a bushel, and not many to be procured for that. Last fall they were from thirty-three to fifty cents. * *

Small beans of the kidney kind are cultivated by the Americans. They are generally planted to climb on the corn, and are of many sorts and different colors. There are some dwarf ones, called bunch beans, and they all appear to do better than in England. * * * Beans and vegetables require to be planted thinner here than in England, that the earth may be moved between them, as they then receive much more benefit from the heavy dews of this country than when the ground is hard. Here are a few Indian peas, in growth, leaf and blossom much like a kidney bean. The pods are very long, and contain from nine to sixteen peas in each; but they resemble but little either peas or beans. * * *

Cabbages grow well; the Americans plant a large backward sort, and make but one sowing and planting out in a year. In the fall they dig them up and bury them in the ground, or rather, they plant them underneath it, as they dig a deep trench, and set a row of cabbages with their roots in it; then, bending the outward leaves over the top of the cabbage, cover them with earth, and thus preserve them in the most severe frosts of this country. * * * * *

Onions are two years coming to perfection. The first year they are sown very thick, and the next they are transplanted, at about eight inches apart, when they grow to a middling size. Prairie onions are common in moist situations, and are very good early in the spring, but soon get hard. The root is very small. As they come up early in the spring, before other vegetables, cows eat them with great avidity, and it gives their milk and butter a disagreeable flavor; this lasts for two or three weeks.

Shallots grow to great perfection, and are planted by the Americans in preference to onions.

I have a few asparagus plants that look well. I have heard they succeed admirably more to the eastward. Here the plants are all young.

Squashes are a sort of gourd, frequently boiled for sauce, and much relished by many. There are a variety of gourds, but I believe of little use, except one sort, which has a hard rind or shell, which serves for many uses, as bottles, pans, ladles and funnels. * * * * * * * *

Cucumbers grow well, and, I believe, are more wholesome than in England, and far more productive.

Parsley and radishes thrive, and, I believe, lettuce; but I have seen but few of them. Horse-radish is very scarce. * * * * *

The woods round the prairies are not so thick, nor the timber so large, as on the river bottoms; but they contain a great variety of trees, viz: Oak of many sorts, as black, *white, red, post, swamp,* laurel, pin, Spanish, and black-jack, and some

others; three kinds of hickory; two of ash; two of elm; two of maple; black walnut, cherry, sycamore, persimmon, gum, hackberry, cotton-wood, mulberry, service-berry, honey locust, sassafras, dog-wood, crab, etc. On the creek bottoms, coffee-berry, poplar, pecan, white walnut, etc., etc. The under-growth in the woods is hazel, spice-wood, red-bud, haws, sumach, plum and brambles. Willows grow on the water-courses. * * * The grape-vines run over the tallest trees in a very extraordinary manner—sometimes reaching from the ground to the boughs of trees forty or fifty feet high, without touching the bodies of the trees. * * *

There are several sorts of grapes, but not in general very good. Soon after our arrival we found some, nearly dried to raisins, good eating, and we used some for tarts and sweet-sauce. I suppose they would make wine, with sugar; but I do not know that any one has tried the experiment. Pomegranates grow on a vine much like a cucumber, the size of an orange, or rather larger; a beautiful fruit of a yellow or orange color, of a most fragrant smell, but I have never tasted one. They are said to be most delicious when preserved. There are many sorts of sweet melons and much difference of size in the various kinds. I have only noticed musk, of a large size, and nutmeg, a smaller one; and a small, pale-colored melon of a rich taste; but there are other sorts with which I am unacquainted. Water-melons are also in great plenty, of vast size; some, I suppose weigh twenty pounds. They are more like pumpkins in outward appearance than melons. They are round or oblong; generally green, or a green and whitish color on the outside, and white or pale on the inside, with many black seeds in them; very juicy; in flavor like a rich water; not sweet and mawkish, but cool and pleasant. After people are accustomed to them, they generally prefer them to sweet melons. They are considered extremely wholesome in warm climates, as they quench thirst and are not feverish. * * *

Persimmon is a fruit many people are fond of; it is something like a medlar. Papaws, or pawpaws, grow in clusters of three or four on a shrub twenty feet high. The fruit is three inches long and about an inch thick; in shape something like a a cucumber; of a yellow color; in flavor something like a pine, but not so rich. Strawberries nearly the same as scarlets, excellent, and in some places in great abundance. We one day gathered more than a peck of beautiful strawberries in my orchard, and we got a great many at other times. They make excellent pies. Raspberries are small and dry. Cherries grow in bunches, the same as currants; very small and bitter. May-apple is a yearly plant, of only two leaves; the stalk one foot high; the fruit the size of a small apple, of a straw color, with some small seeds; very pleasant tasted. Plums are mostly small and sour, but there are some whose flavor resembles that of a gooseberry. I have before remarked on the excellence of the blackberries. The elderberries are fine, but generally eaten by the birds as soon as colored. Pecan is a sort of walnut, said to be the finest nut in this country. White walnut or butternut, and black walnut, are not so good as the English walnut. Hazel-nuts are in vast quantities; the shells hard, but the kernels good. I have some earth-nuts growing in my garden; the green of them something like clover, or rather lucern. They blow with a small yellow blossom. I planted them in rows, and earthed them up like potatoes. They have two kernels inclosed in a husk about one inch long, and as large round. * * *

Fruit and all other trees are of much more rapid growth here than in England. There are not many orchards yet planted, and none of them come to bear much, as the oldest settlement round the prairies has not been made more than four years.

* * * * * * * * * *

The soil is a light vegetable mold, of no great depth in general. The under-soil is a fat loam or clay, of considerable depth, that retains moisture, and prevents the land from burning. The land is easy of culture—much more so than any I was ever accustomed to—and dry enough to plow in a day after heavy rain; this is the case with most of the land round the prairies. Prairie land is hard to break up the first time, and requires four horses to do it effectually, it being so full of strong roots—in particular, one called red-root, that runs a great deal; and in moist places there is a small shrub named white-root, which must be grubbed up before it can be plowed; and sometimes there is a little brush-wood of different sorts to clear off.

Ford, in his history of Illinois, throws some light on the social and industrial condition of the people of our State from the years 1818 to 1830:

In the year 1818 the whole people numbered about forty-five thousand souls. Some two thousand of these were the descendants of the old French settlers in the villages of Kaskaskia, Prairie du Rochor, Prairie du Pont, Cahokia, Peoria and Chicago. These people had fields in common for farming, and farmed, built houses, and lived in the style of the peasantry in old France a hundred and fifty years ago. They had made no improvements in anything, nor had they adopted any of the improvements made by others.

They were the descendants of those French people who had first settled the country, more than a hundred and fifty years before, under Lasalle, Ibberville, and the priests Alvarez, Rasles, Gravier, Pinet, Marest and others, and such as subsequently joined them from New Orleans and Canada; and they now formed all that remained of the once proud empire which Louis XIV, King of France, and the Regent Duke of Orleans, had intended to plant in the Illinois country. The original settlers had, many of them, intermarried with the native Indians, and some of the descendants of these partook of the wild, roving disposition of the savage united to the politeness and courtesy of the Frenchman. In the year 1818, and for many years before, the crews of keel boats on the Ohio and Mississippi rivers were furnished from the Frenchmen of this stock. Many of them spent a great part of their time, in the spring and fall seasons, in paddling their canoes up and down the rivers and lakes in the river bottoms, on hunting excursions in pursuit of deer, fur and wild fowl, and generally returned home well loaded with skins, fur and feathers, which were, with them, the great staples of trade. Those who stayed at home contented themselves with cultivating a few acres of Indian corn in their common fields for bread, and providing a supply of prairie hay for their cattle and horses.

No genuine Frenchman, in those days, ever wore a hat, cap or coat The heads of both men and women were covered with Madras cotton handkerchiefs, which were tied around in the fashion of night caps. For an upper covering of the body, the men wore a blanket, called a "capot," (pronounced cappo) with a cap to it at the back of the neck, to be drawn over the head for a protection in cold weather, or in warm weather to be thrown back upon the shoulders in the fashion of a cape. Notwithstanding this people had been so long separated by an immense wilderness from civilized society, they still retained all the suavity and politeness of their race. And it is a remarkable fact that the roughest hunter and boatman amongst them could, at any time, appear in a ball room or other polite and gay assembly with the carriage and behavior of a *well bred gentleman.*

The Frenchwomen were remarkable for the sprightliness of their conversation and the grace and elegance of their manners. And the whole population lived lives of alternate toil, pleasure, innocent amusement and gaiety.

Their horses and cattle, for want of proper food and care for many generations, had degenerated in size, but had acquired additional vigor and toughness, so that a French pony was a proverb for strength and endurance. These ponies were made to draw sometimes one alone, sometimes two together, one hitched before the other, to the plow or to carts made entirely of wood, the bodies of which held about double the contents of the body of a common large wheelbarrow. The oxen were yoked by the horns instead of the neck, and in this mode were made to draw the plow and cart. Nothing like reins were ever used in driving; the whip of the driver, with a handle about two feet and a lash two yards long, stopped or guided the horse as effectually as the strongest reins.

The French houses were mostly built of hewn timber set upright in the ground, or upon plates laid upon a wall, the intervals between the upright pieces being filled with stone and mortar. Scarcely any of them were more than one story high, with a porch on one or two sides and sometimes all around, with low roofs extending with slopes of different steepness from the comb in the center to the lowest part of the porch. These houses were generally placed in gardens, surrounded by fruit trees of apples, pears, cherries, and peaches; and in the villages each inclosure for a house and garden occupied a square or the greater part of one. Each village had its Catholic church and priest. The church was the great place of gay resort on Sundays and holidays, and the priest was the adviser and director and companion of all his flock. The people looked up to him with affection and reverence, and he upon them with compassion and tenderness. He was ever ready to sympathise with them in all their sorrows, enter into all their joys, and counsel them in all their perplexities. Many good Protestant ministers, who stoutly believe the Catholic priests to be the emissaries of Satan, would have done well to imitate their simple-hearted goodness to the members of their flocks. * * * *

Commerce, from 1818 to 1830, made but a small progress. Steamboats commenced running the western waters in 1816, and by the year 1830 there were one or two small ones running on the Illinois river as far up as Peoria, and sometimes further. The old keel boat navigation had been disused; but as yet there was so little trade as not to call for many steamboats to supply their place. The merchants of the villages, few in number at first, were mere retailers of dry goods and groceries; they purchased and shipped abroad none of the productions of the country, except a few skins, hides and furs, and a little tallow and beeswax.

They were sustained in this kind of business by the influx of immigrants, whose money, being paid out in the country for grain, stock and labor, furnished the means of trade.

The merchant himself rarely attempted to barter business, and never paid cash for anything but his goods. There was no class of men who devoted themselves to the business of buying and selling, and of making the exchanges of the productions at home for those of other states and countries. The great majority, in fact nearly all the merchants, were mere blood suckers; men who with a very little capital, a small stock of goods, and with ideas of business not broader than their ribbons nor deeper than their colors, sold for money down, or on a credit for cash, which, when received they sent out of the country. Since their time, a race of traders and merchants has sprung up who use the money they receive for goods in purchasing the

wheat, corn, beef and pork of the farmers; and ship these articles to the eastern cities. Mather, Lamb & Co., late of Chester, in Randolph county, but now of Springfield, were the first to engage in this business, and they were led to it by the refusal of the United States Bank, at St. Louis, to grant them the usual facilities of trade. As they could get no accommodation from the bank, they fell upon this course to avoid going to St. Louis to purchase eastern exchange.

Peck's Guide for Emigrants, published in 1831, contains a large amount of matter relating to the condition and progress of agriculture and the useful arts at that period, as well as some information concerning the climate and natural productions of the country, from which I extract the following:

The soil of the American bottom is as rich as land can be made, and that to the average depth of twenty-five feet. About the French towns it has been cultivated and produced corn in succession, without manuring, for more than a century without exhausting its fertilizing powers. It is evident, however, that such an injudicious method as has been pursued by farmers in this country renders the soil more adhesive or clammy and exposes it to bake in the sun. * * *

These bottoms, especially the American, are the best regions in the United States for raising stock, particularly horses, cattle and swine. Seventy-five bushels of corn to the acre is an ordinary crop. The roots and worms of the soil, the acorns and other fruits from the trees, and the fish of the lakes, accelerate the growth of swine. Horses and cattle find exhaustless supplies of grass in the prairies, and pea vines, buffalo grass, wild oats and other herbage in the timber for summer range, and often throughout most of the winter. In all the rush bottoms they fatten during the severe weather on rushes. The bottom soil is not so well adapted to the production of small grain as of maize or Indian corn, on account of its rank growth, and being more subject to blast or fall down before harvest, than on the uplands. The upper part of the American bottom is somewhat subject to a disease in cattle, called the *milk sickness*, described under the head of diseases. * * *

The following graphical description is copied from the Illinois Monthly Magazine, conducted by James Hall, Esq., a gentleman well known abroad as a fine writer. It is from the pen of the editor, under the head of "Notes on Illinois," Vol. I, pp. 60—64:

"The most of the country which lies south of a line drawn from the mouth of the Wabash to the mouth of the Kaskaskia is covered with timber. A very few prairies, and those inconsiderable in point and size, may be found immediately south of this line. Crossing that line, the timber is found to decrease in quantity and the prairies to expand, yet the latter are still comparatively small, wholly unconnected with each other, and their outlines distinctly marked by the thick forests which surround and separate them. Advancing to the north, the prairie surface begins to predominate; the prairies now become large and communicate with each other like a chain of lakes, by means of numerous avenues or vistas; still, however, the traveler is surrounded by timber, his eye never losing sight of the deep green outline throwing out its capes and headlands, though he sees no more than dense forests and large treees, whose deep shade almost appalled him in the south.

Traveling on from the center of the State to its northern limits we find ourselves surrounded by one vast *prairie*. *In the* country over which we have passed, the

forest is interspersed with these interesting plains; *here*, the *prairie* is studded with groves and copses, and the streams fringed with strips of woodland. The eye sometimes wanders over immense plains covered with grass, discovering no other object on which to rest, and finding no limit to its vision but the distant horizon; while, more frequently, it wanders from grove to grove, and from one point of woodland to another, charmed and refreshed by an endless variety of scenic beauty.

The prairies afford a subject of curious inquiry to every traveler who visits these States. That these vast and fertile plains should be totally destitute of trees seems to be an anomaly in the economy of nature. Upon the mind of an American, especially, accustomed to see new lands clothed with timber, and to associate the idea of damp and silent forests with that of a new country, the appearance of sunny plains and a diversified landscape, untenanted by man and unimproved by art, is singular and striking. Perhaps, if our imaginations were divested of those associations, the subjects would present less difficulty; and if we could reason abstractly, it might be as easy to account for the existence of a prairie as a forest."

The growth of the bottom lands consists of black walnut, ash of several species, hackberry, elm, (white, red and slippery,) sugar maple, honey-locust, buckeye, catalpa, sycamore, cotton-wood, pecan, hickory, mulberry, several oaks, as overcup, bur-oak, swamp or water-oak, white, red or Spanish oak; and of the shrubbery are, red-bud, papaw, grape-vine, dog-wood, spice-bush, hazel, green-brier, etc. Along the margin of the streams, the sycamore and cotton-wood often predominate, and attain to an amazing size. The cotton-wood is of rapid growth—a light, white wood, sometimes used for rails, shingles and scantlings; not lasting, but of no great value. Its dry, light wood is much used in steamboats. It forms the chief proportion of the drift-wood that floats down our rivers, and is frequently converted into planters, snags and sawyers. The sycamore is the button-wood of New England; is frequently hollow, and in that state procured by the farmers, cut at suitable lengths, cleaned out, and used as depositories for grain. They answer the purpose of large casks. The size of the cavity of some of these trees appears incredible in the ears of a stranger to the luxuriant growth of the West. To say that twenty or thirty men could be comfortably lodged in one would seem a monstrous fiction to a New Englander; but to those accustomed to this species of tree on our bottoms, it is nothing marvelous.

The uplands are covered with various species of oak, among which is the post-oak, a valuable and lasting timber for posts; white oak, black oak of several varieties, and the black-jack, a dwarfish, gnarled looking tree, good for nothing but fuel, for which it is equal to any tree we have. Of hickory, we have both the shag-bark and smooth-bark; black walnut, in some parts, white walnut or butternut, lynn, (the bass-wood of New England,) cherry, and many of the species produced in the bottoms. The black walnut is much used for building materials and cabinet work, and sustains a fine polish. The different species of oaks, walnuts, hackberry, and occasionally hickory, are used for fencing.

In some parts of the State, the white and yellow poplar prevails. Beginning at the Mississippi, a few miles above the mouth of the Muddy River, * * * and extending a line across the State to the Little Wabash, leaves the poplar range south, interspersed with occasional clumps of beech.

Near the Ohio, on the low creek bottoms, the cypress is found. No poplar exists on the eastern borders of the State, till you arrive at or near Palestine; while on *the opposite shore* of the Wabash, in Indiana, the poplar and beech predominate.

ear Palestine, in Crawford county, the poplar again commences, intermixed with eech, and all the varieties of timber, and extends northward further than I have plored. A spur of it puts into the interior of the State on the Little Wabash, ove Maysville. It is reported that in some of the northern portions of the State, me chestnut timber is found. I have never seen a tree in its natural growth, west f the middle of Indiana.

Occasional clumps of stunted cedar are to be seen on the cliffs that overhang the ottoms, but no pine, unless it exists in the wild regions of Lake Michigan.

Timber not only grows much more rapidly in this country than in the Northern itates, but it decays sooner when put in buildings, fences, or in any way exposed to he weather. It is more porous, and will shrink or expand as the weather is wet or ry, to a m.ch greater extent than the timber of New England. This may be owing artly to the atmosphere, but it is unquestionably owing in part to the quality of he timber. I have brought two wagons, or carriages, to this country, which were ade in Litchfield, Conn., and they have lasted much longer than those made from he timber of Illinois. Our fences require to be new laid, and one-third of the rails rovided anew, in a period of from seven to ten years. A shingled roof requires placing in about twelve years. This, however, may not be a fair estimate, because ost of our timber is prepared hastily, and in a green state. Doubtless with proper re in the seasoning and in the preservation it would last much longer.

Timber is ordinarily required for four purposes: fencing, building, fuel, and echanical operations. I have already shown that rails are almost the only article ed for fencing. In making a plantation in this mode requires a great waste of mber. Nor will a man, with a moderate capital, and with the burden of a conantly increasing family, stop to make experiments. He must have fields inclosed, d takes the quickest and cheapest method, by cutting down the most convenient mber and making rails. Ditching has been attempted in but a few instances, and ithout success. In the dry season, the turf withers on the embankment, the dry rth crumbles down, and the ditch offers no obstacle to the inroads of cattle, rses and swine, and these must run in droves over the prairies.

Some feeble attempts have been made to substitute a live hedge of crab-apple, d of honey locust, without success. So long as such extensive portions of the untry lie uncultivated and waste, as a great common field for cattle, horses, swine d all other stock, it is not an easy matter to produce a hedge that will be imperous to these animals. The white thorn has not yet been tried, within my knowdge. It may succeed, especially if set within an inclosure for a few years, till its owth is matured.

A farm is to be inclosed, within a few miles from my residence, with plank, or, as New Englander would say, *boards*, sawed at the mill, the cost of which will not ceed seventy-five cents per rod. But a great saving in fencing is made by making rge fields, from forty to one hundred and fifty acres. I have no doubt but time ill bring forth substitutes for fencing, and which will be a great saving of timber.

The first buildings put up are of logs, slightly hewn on two sides, and the corners tched together. The roof is made of clapboards, split like staves, four feet in ngth, and six or eight inches in width. Two layers of these are so adjusted as to ver the cracks, and on the whole are laid heavy poles to bind down and hold the of. This description of building is called a "cabin." These are made single, or uble with a space between, according to the enterprise, force, or taste of the ner.

Around it are usually put up a meat or smoke-house, a kitchen or cook-house, a stable and corn-crib, and perhaps a spring-house to keep milk cool in summer—all built in the same manner as the dwelling. Floors are usually made of timber split into slabs, called "puncheons," with the upper surface hewn level.

The next step in advance for a dwelling is a *log house.* This is made of logs hewn on two sides to an equal thickness, the ends notched together, apertures cut through for doors and windows, a framed and shingled roof, and a brick or stone chimney. The chimney of the cabin is invariably built of sticks of wood—the largest at the bottom, and the smallest at the top, and laid up with a supply of mud or clay mortar. The interstices between the logs of both the cabin and log house are chinked with strips of wood, and daubed with the same species of mortar, both outside and in, unless the convenience of lime is added. * * * *

Sink-holes are circular depressions in the surface, resembling a basin or a bowl. I have seen them of various sizes, from ten to fifty feet deep, with steep acclivities, and from ten to fifty yards in diameter at the surface of the ground. They usually are found near the bluffs, and in most cases contain an outlet at the bottom for the water received by the rains to descend into the earth, and find a subterraneous passage among the rocks below. Trees and grasses are found growing within these cavities.

In all countries where the sub-stratum is of secondary limestone, caverns and subterranean passages exist. By the action of the water, the soil above those passages becomes loosened, and is gradually undermined till a *sinking* of the surface takes place. I have seen these sink-holes in all stages of existence, from that where the earth had just fallen in, to those which were partially filled up by the annual deposits, and sustaining large trees on the bottom and sides. * *

I have already mentioned that stone coal abounds in Illinois. It may be seen frequently in the ravines and gulleys, and in the points of bluffs. Exhaustless beds of this article exist in the bluffs of St. Clair county, bordering on the American bottom, of which large quantities are transported to St. Louis for fuel. It sells in St. Louis from ten to twelve and a half cents per bushel. From twelve to fifteen large ox-wagons are employed most of the year in hauling it to market, the distance of seven miles across the American bottom.

There is scarcely a county in the State but what can furnish coal in reasonable quantities. Large beds are said to exist near the junction of Fox River with the Illinois, and in the vicinity of the rapids of the latter. * * *

In most parts of the State, grape-vines indigenous to the country are abundant, which yield grapes which might advantageously be made into excellent wine. Foreign vines are susceptible of easy cultivation. These are cultivated to a considerable extent at Vevay, Switzerland county, Indiana, and at New Harmony, on the Wabash.

The indigenous vines are prolific, and produce excellent fruit. They are found in every variety of soil: interwoven in every thicket in the prairies and barrens, and climbing to the tops of the very highest trees on the bottoms.

The French in early times made so much wine as to export some to France; upon which, the proper authorities prohibited the introduction of wine from Illinois, lest it might injure the sale of that staple article of the kingdom. I have not the documents at hand that will attest this fact, but of its truth there is no doubt; and I think the act was passed by the board of trade in 1774.

The editor of the Illinois Magazine remarks: "We know one gentleman who nade twenty-seven barrels of wine in a single season, from the grapes gathered rith but little labor in his immediate neighborhood."

I have frequently drank of this domestic beverage. Almost any family, if they choose, can make a barrel or two for their use.

The wild plum is found in every part of the State; but in most instances the fruit is too sour for use, unless for preserves.

Crab apples are equally prolific, and make fine preserves, with about double their bulk of sugar. Wild cherries are equally productive. The persimmon is a delicious fruit, after the frost has destroyed its astringent properties. The black mulberry grows in most parts, and is used for the feeding of silk-worms with success. They appear to thrive and spin as well as on the Italian mulberry. The gooseberry, strawberry and blackberry grow wild, and in great profusion. Of our nuts, the hickory, black walnut and pecan deserve notice. The last is an oblong, thin-shelled, delicious nut, that grows on a large tree, a species of hickory. (The *Carya olivaformis* of Nuttall.)

The papaw grows in the bottoms, and rich, timbered uplands, and produces a large, pulpy and delicious fruit.

Of domestic fruits, the apple and peach are chiefly cultivated. Pears are tolerably plenty in the French settlements, and quinces are cultivated with success by some Americans. Apples are easily cultivated, and are very productive. I have seen a tree in Missouri, which bore apples the third year from the seed. Many varieties of fine flavor, and grow to a large size. I have measured apples, the growth of St. Clair county, that exceeded thirteen inches in circumference.

Some of the early American settlers provided orchards. They now reap the advantages. But a large proportion of the population of the frontiers are content without this indispensable article in the comforts of a Yankee farmer.

Cider is made in small quantities in the old settlements. In a few years, a supply of this beverage can be obtained in most parts of Illinois. Peach trees grow with great rapidity, and decay proportionably soon. From ten to fifteen years may be considered the life of this tree. Our peaches are delicious, but they sometimes fail, by being destroyed in the germ by winter frosts. The bud swells prematurely. In the severity of the past winter, most of the young buds, and in some instances the limbs of the tree, have been destroyed.

The following is a memorandum made in the spring of 1830, which will give some idea of the forwardness of our seasons:

April 1. Peach trees in bloom.
" 2. Asparagus fit for the table.
" 3. Peas, beans and onions planted.
" 6. Heart's-ease and violets in bloom.
" 7. Beets, carrots, parsnips and other roots planted.
" 10. Spring had completely opened, and the prairies were green. Gooseberry and currant bushes in bloom.
" 15. Cabbage plants transplanted.
" 18. Lilac and strawberries in bloom.
" 19. A great variety of wild flowers in full bloom.
" 20. Nearly all our garden seeds had been planted.
" 25. Raspberries in bloom.
" 27. *Lettuce, radishes and pepper-grass* fit for use.
" 30. *Roses and honey-suckles* in full bloom.

A gentleman of Jacksonville, whose veracity may be depended upon, informed us that he saw a cabbage, which was raised on the farm of Major Simms, Diamond Grove, that measured thirteen feet and three inches in circumference. A cabbage head three feet in diameter, or nine feet in circumference, is no novelty in this soil. Beets often grow to the size of sixteen or eighteen inches in circumference.

The *cultivated vegetable productions in the field* are maize or Indian corn, wheat, oats, barley, buckwheat, Irish potatoes, sweet potatoes, turnips, rye for horse feed and distilleries, tobacco, cotton, hemp, flax, and every other production common to the middle States.

Maize is the staple production. No farmer can live without it, and thousands raise little else. This is chiefly owing to the ease with which it is cultivated. Its average yield is fifty bushels to the acre. We have oftentimes seen it produce seventy-five bushels to the acre, and in a few instances exceed one hundred.

Wheat produces a good and sure crop, especially in Morgan, Sangamon and other counties north. I have weighed the growth of St. Clair county repeatedly, and its average weight per bushel exceeded sixty pounds.

A gentleman of this county harvested a field of thirty acres in 1820. He gave a friend one measured acre, which he reaped, threshed it out on the ground (a usual mode), and cleaned up thirty-five bushels and eight quarts. Some, of course, was wasted. I purchased my wheat, in 1821, of this farmer, from the same field, and weighed several bushels, which averaged sixty-six pounds to the bushel.

A gentleman, and a large wheat grower, emigrated from the interior of New York the same season, with whom I had several disputes about the quality of Illinois wheat; he constantly affirming it could never equal the wheat of the lake country of New York. I took him to a yard in the vicinity, where were twelve or fifteen large stacks of wheat. He pulled out a number of handfuls from different stacks, examined them carefully, and his opinion yielded in a moment. Flour from the Illinois river and from the Boon's lick country, in Missouri, now has preference in the New Orleans market, before Ohio and Kentucky flour. A commission house in St. Louis showed me letters from New Orleans substantiating that fact.

A very common, but bad practice among our farmers, is to sow wheat in the corn-fields, amongst the standing corn, in September, and plow it in by running a few furrows between the roots. The dry stalks are cut down in the spring and left on the ground. Even by this imperfect and slovenly mode, fifteen or twenty bushels of wheat to the acre are produced. But where the ground is duly prepared by fallowing, and the seed put in at the proper time, a good wheat crop, averaging from thirty to thirty-five bushels to the acre, rarely fails. The ordinary price of wheat is fifty cents per bushel, and is rather on the rise. Flouring mills begin to be erected, which will create a demand for this article, and if the price of flour abroad should advance, wheat in Illinois will rise in proportion. Considering the cheapness of the land, the productiveness of the soil, and the ease with which a crop of wheat is cultivated, compared with the grain-growing States of the north, wheat is a profitable article for the Illinois farmer at fifty cents per bushel. Harvest ordinarily commences the last week in June, and is finished about the fourth of July. The richness of the soil brings the grain to its greatest perfection, while the dryness of the atmosphere protects it from those injuries which are produced by moisture.

Few of our farmers have barns or threshing floors; the grain is put up in stacks, *exposed to the* weather, and trod out with horses on the ground, with considerable *loss and injury*; and yet, with all these disadvantages—which time and industry

will overcome—the flour of Illinois and Missouri is superior to that of other western States, when properly maufactured.

Maize or Corn. I have already hinted that this species of grain is the staple of the country. An industrious man and one horse will cultivate twenty acres in a season. The product may be estimated, on an average, at one thousand bushels. The cultivation and harvesting of this crop, after deducting bad weather, and other hindrances, will occupy about four months. Corn often sells in the field, after gathering, in the fall at twelve and a half cents per bushel, in the ears—three half bushels of ears heaped, equals one bushel of shelled corn. The value of the crop, then, before it is cribbed, is $125.

One shilling per bushel, New England currency, is a common price after being stored in the crib. In St. Louis, it rarely sells for less than twenty-five cents.

The method of raising a crop of corn, after the prairie sward is broken up, and cultivated a season or two, is extremely simple and cheap. It is a bad practice but a common one, to grow corn on the same ground for years in succession.

In producing a crop of corn, the dry stalks are chopped down in the spring with a hoe, collected in heaps with a horse rake, and burned. A much better practice is to let them rot in the soil, and unless very large, they do not impede the plough. The ground is then plowed up smooth usually with two horses; but if light, one horse will often do this plowing. Good managers then harrow the ground, but thousands do not. The next process is to "list" it; that is, to strike straight furrows through the field, in the proportion of four to a rod, and cross these at right angles. This is usually done with a single horse and a light plow. The corn is then dropped with the hand in the intersection of the furrows, five or six grains in each hill, and covered with the hoe—sometimes with the plow, by passing a light furrow over it. Soon as the corn is of a suitable hight, the horse and plow must be in the field at an early hour in the morning. An industrious farmer sees the sun rise in his cornfield.

This is now the most busy season of the whole year for the farmer. Then comes the "tug of war" between industry and the weeds. The astonishing rapidity with which every species of vegetation puts forward at this season and in this climate, makes it indispensable for the farmer to be active. Even the class of frontier men who spend one-half of the year in indolence or in hunting excursions, will not neglect the corn-field. I have repeatedly observed that the corn-fields of our plodding Yankees, before they become sufficiently acquainted with the country and its habits, look worse for weeds than those of the otherwise careless backwoodsman. After the corn is planted, the hoe is thrown aside, unless casually used to chop down a few large weeds in the hills, and the whole process of cultivation is conducted by the plow. The unphilosophical notion of a New England farmer in *hilling* corn, is unknown here; and it is a very useless expedient anywhere. Nature has so organized the corn stalk that it will grow out a set of roots, two or three inches above the ground, which strike the earth at a proper distance from the stalk, and serve as supporters. Raising a hill round the plant does a positive injury by preventing these shoots. Corn ordinarily requires three plowings, the last of which is usually performed after wheat harvest, from the 4th to the 12th of July. In luxurious fields it is necessary for the process of suckering to be performed. The sprouts that start out near the roots of the plant are pulled off, and the smaller stalks from the hill thinned out, so as to leave only four healthy stalks. To use the phrase of the country, the corn is then "laid *by*," *and the leisure and lazy* season of the farmer commences.

About the middle of September, the corn-fields are again entered to gather the "blades"—the leaves—which are stripped from the stalks below the ears, properly dried, bound in bundles, and saved for fodder. This is the common, rough food, in addition to corn, given to horses, calves, etc. The stalks are sometimes topped and saved.

Corn is frequently planted late in June, and even the first week in July, and cut up before frost for winter food for cattle; and it furnishes a cheap and nutritious diet for stock. The husks are appropriated to a similar purpose.

In breaking up prairie after the grass starts in the spring, which is the best time to subdue the tough sward, corn is sometimes dropped in every fourth furrow, or planted in the newly turned up soil, by striking an axe into the sod and dropping the grain, where it is left to grow spontaneously. Sometimes large quantities of fodder are thus obtained.

Hemp is an indigenous plant in the southern part of this State, as it is in Missouri, It has not been extensively cultivated, but whenever tried is found very productive, and of an excellent quality. It might be made a staple of the country.

Tobacco, though a filthy and noxious weed which no human being ought ever to use, can be produced in any quantity, and of the first quality, in Illinois.

From the county of Wayne a good many hogsheads have been annually exported, for some years past, and the result of the experiment has been altogether satisfactory. It has been raised to some extent throughout the southern counties. A few hogsheads, which were sent from Randolph county to New Orleans, some years since, was pronounced by the inspector to be the best ever brought to that market. We could not adduce a stronger proof than this in favor of our soil and climate. The tobacco plant, although coarse in its appearance, is one of the most delicate in the vegetable kingdom. It thrives only in a rich, light and warm soil. It requires to be planted early in the spring, and gathered late in autumn.

Cotton, for many years, has been successfully cultivated in this State for domestic use, and some for exportation. Two or three spinning factories are in operation, and produce cotton yarn from the growth of the country with promising success.

Flax is produced, and of a tolerable quality, but not equal to that of the northern States. It is said to be productive and good in the northern counties.

Barley is raised in St. Clair county for the St. Louis breweries. It yields well, is a sure crop, and sells in St. Louis from thirty-seven and a half to fifty cents per bushel.

The *Palma Christi*, or castor oil bean, is produced in considerable quantities in Madison, Randolph and other counties, and large quantities of oil are expressed and sent abroad. About twelve thousand gallons will be made in Edwardsville the present season. The bean is a more profitable crop to the farmer than corn, finds a ready market, and sells from seventy-five cents to one dollar per bushel,

Sweet potatoes are a delicious root and yield abundantly, especially on the American bottom, and rich, sandy prairies.

But little has been done to introduce cultivated grasses. The prairie grass looks coarse and unsavory, and yet our horses and cattle will leave the best timothy for it. It is already known to the reader that this grass disappears when the settlements extend round a prairie, and the cattle eat off the young growth in the spring. Consequently, in a few years the natural grass no longer exists. This, however, can be preserved by fencing in a tract of fresh prairie and mowing it regularly every season, or burning it over in the fall. In this way excellent meadows can be kept forever.

It is thought by some that the seed might be gathered in the fall, sown on land that had been kept free from weeds, and by these means meadows of the natural grass of the country might be formed.

Timothy grass begins to be cultivated with success. For the first three or four years of my residence in this country, it was doubtful whether clover, timothy or any other cultivated grasses could be made profitable for meadows in this rich soil and dry climate. I observed that, in attempts to make meadows, the weeds soon overrun the grass. But this notion was entirely incorrect. To produce timothy with success, the ground must be well cultivated in the summer, either by an early crop or by fallowing, and the seed sown about the 20th of September at the rate of *ten or twelve quarts of clean seed to the acre*, and lightly brushed in. If the season is in any way favorable, it will get a rapid start before winter. By the last week in June, it will produce from a ton and a half to two tons per acre of the finest of hay. It then requires an annual dressing of stable manure, and occasionally the turf may be scratched with a harrow, to prevent the roots from binding too hard. By this process timothy meadows may be made and preserved. There are meadows in St. Clair county which have yielded heavy crops of hay in succession for seven years, and bid fair to continue for an indefinite period.

Cattle, and especially horses, should never be permitted to run in meadows in Illinois. The fall grass may be cropped down by calves and colts. There is but little more labor required to produce a crop of timothy than a crop of oats and as there is not a stone or a pebble to interrupt, the soil may be turned up every third or fourth year for corn, and afterwards laid down to grass again.

A species of blue grass is cultivated by some farmers for pastures. If well set and not eaten down in summer, blue grass pastures may be kept fresh and green till late in autumn or even in the winter. The English spire grass has been cultivated with success in the Wabash country.

Of the trefoil or clover, there is but little cultivated. A prejudice exists against it, as it is imagined to injure horses by affecting the glands of the mouth and causing them to slaver. It grows luxuriantly, and may be cut for hay early in June. The white clover comes in naturally where the ground has been cultivated and thrown by, or along the sides of old roads and paths.

The following outline of Gallatin saline and works has been politely furnished by Gen. Leonard White, clerk of the county:

There are nine furnaces containing on an average, sixty kettles each, holding from thirty-six to sixty gallons, and which make upwards of three thousand bushels per week, averaging about 130,000 bushels per annum, after deducting lost time. The works are carried on by Messrs. B. White, J. Davis, John Crenshaw, W. Weed and C. Guard. Salt sells at the works from thirty-seven and a half to fifty cents per bushel. A bushel of salt is fifty pounds. About one-half of the salt manufactured here is exchanged for corn, corn meal, flour, beef, pork, potatoes, onions and every article that can be raised in the country. The usual rates of exchange are two bushels of corn for one of salt, one and a half bushels of corn meal for one of salt. Four bushels of salt are given for one hundred pounds of beef, six bushels for one hundred pounds of pork, four bushels for one hundred pounds of flour, and the same in proportion for other articles of produce. Thus the farmers are supplied with salt at a cheap rate, and find a market for all their products at home.

As to the salt works at this place (Brownsville), there is one furnace with fifty-five kettles, *that boil thirty-five gallons* each, and which make one hundred bushels

of salt per week. In the present situation of the works, it takes three hundred gallons of water to make one bushel of salt. This is owing to the well being tubed, and the fresh water not being excluded, which will be effected during the present year. The well is two hundred and three feet deep, and the fountain is so strong that it gushes six feet above the surface of the ground, and in quantity sufficient to run five furnaces. Salt water can be had in many places in this county, and it is my opinion that much better water can be had by boring deeper, than in any other part of the State.

Mr. William H. Nielson has commenced boring for salt water one mile below Brownsville, on the banks of the Big Muddy river, and has gotten down one hundred and thirty-seven feet, at which distance he has plenty of water, fully as strong as mine. He intends boring three hundred feet deep, unless he gets water sufficiently strong at a less distance. He will erect this summer two furnaces of the following description : Two pans of twenty feet in length and five feet in width, which will hold about twelve hundred gallons of water, and thirty kettles in each furnace of sixty gallons, all of which, together with copper tubes for the well, and sundry other articles necessary for the furnaces have arrived at the place. The salt made here is superior to that made at the Ohio saline, near Shawneetown, and I have no doubt there will be large quantities made in a few years. Mr. Nielson has opened a very extensive coal bank about four miles above Brownsville. The mine is inexhaustible, as far as the experiment has been tried, and the coal equal to that at Pittsburg in quality.

He is preparing to send off ten boats loaded with coal this season, and contemplates sending sixty boats next season. Mr. Nielson's coal bank is immediately in the banks of the Big Muddy river, and is so convenient that the coal can be thrown from the bank into the boats. There are a number of beds of coal in this county, and equally good.

Castor oil.—Considerable quantities of this article are manufactured in Illinois. There is one castor oil press in Edwards county, three in Randolph county, and two at Edwardsville, in Madison county.

The manufacture of this article at Edwardsville was commenced by Mr. John Adams, in 1825; in which season he made five hundred gallons, which sold at the rate of $2 50 per gallon. In 1826, he made eight hundred gallons, at the price of $1 50; in 1827, one thousand gallons, at $1 25; in 1828, eighteen hundred gallons, which sold for $1 00; in 1829, he made five hundred and twenty-eight gallons, at the price of $1 12½; in 1830, two presses were started and made ten thousand gallons, from 75 to 87 cents per gallon. The present season he will make about twelve thousand five hundred gallons, and the wholesale price is about seventy-five cents.

One bushel of the castor bean or *palma christi* will yield about seven quarts and a half pint of oil.

The beans are cleaned and well dried or heated in a furnace, put in a cylinder, and the screw, which is an immense one of wood, forces down a follower with great power. The screw is turned by a horse and a large lever, precisely similar to that of a cider mill, in New England called a nut mill.

Beans are purchased from the farmers for seventy-five cents per bushel.

INDEX.

—28

SECOND ANNUAL REPORT

OF THE

BOARD OF TRUSTEES

OF THE

ILLINOIS INDUSTRIAL UNIVERSITY,

FOR THE ACADEMIC YEAR

COMMENCING SEPT. 14, 1868, AND ENDING JUNE 5, 1869.

WITH A REPORT OF THE

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JANUARY 12TH TO 22D, 1869.

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OFFICERS AND COMMITTEES OF BOARD OF TRUSTEES.

APPENDIX TO REPORT VOLUME.

CIRCULAR AND CATALOGUE

OF THE

OFFICERS AND STUDENTS

OF THE

ILLINOIS INDUSTRIAL UNIVERSITY,

URBANA, CHAMPAIGN COUNTY,

Post Office..CHAMPAIGN.

ILLINOIS INDUSTRIAL UNIVERSITY.

THE ILLINOIS INDUSTRIAL UNIVERSITY is located between the contiguous cities of Urbana and Champaign, Champaign County, Illinois, 128 miles from Chicago, on the Chicago branch of the Illinois Central Railroad.

It was first opened for the reception of students on Monday, the 2d day of March, 1868.

The Industrial University was founded by an act of the Legislature, approved February 28, 1867, and endowed by the Congressional grant of *four hundred and eighty thousand* acres of land scrip, under the law providing for Agricultural Colleges. It was further enriched by the donation of Champaign county, of farms, buildings, and bonds, valued at $400,000.

The main University building is of brick, one hundred and twenty-five feet in length, and five stories in height. Its public rooms are sufficient for the accommodation of over four hundred students, and it has private study and sleeping rooms for one hundred and twenty. The cities of Champaign and Urbana, which are connected by a street railroad running past the University grounds, are well supplied with churches and schools, and afford abundant facilities for boarding and rooming a large body of students.

The University domain, including ornamental and parade grounds, experimental and model farms, gardens, etc., comprises over one thousand acres of land.

AIMS OF THE UNIVERSITY.

The chief aim of the Industrial University, as expressed in the law of Congress, is "THE LIBERAL AND PRACTICAL EDUCATION OF THE INDUSTRIAL CLASSES in the several pursuits and professions in life." In order to do this, it is required, under the Statute of Incorporation, "*to teach, in the most thorough manner*, such branches of

learning as are related to Agriculture and the Mechanic Arts, and Military Tactics, without excluding other scientific and classical studies." The hope of the Trustees and Faculty is that the Institution will produce scholars of sound learning, but also of practical sense and skill—men abreast with their times—men of Christian culture, trained to affairs, and able and willing to lend a helping hand in all the great practical enterprises of this most practical age; fitted to be leaders, if need be, in those mighty industrial interests on which the social well-being and civilization of our country so much depend. It is also their aim and hope that the University shall contribute to the increase and diffusion of real science, and especially of that science which bears upon and promotes the useful arts.

DEPARTMENTS OF STUDY.

The following new and enlarged statement of the Departments of Study and Instruction, has been prepared to prevent the injurious misapprehensions which are stated to have grown, in some instances, out of former enumerations of studies. Classes are already at work in most of these Departments and will be organized in the others when the wants of students shall require it.

Special prominence is given to those "branches of learning related to Agriculture and the Mechanic Arts," but entire liberty is allowed to each student to select such studies as he may be prepared to pursue. The University is designed more especially for young men who have already attained such age that they may properly claim to be the judges of their own wants. It is not thought useful or right to attempt to urge every student, without regard to his capacity, or tastes, or practical wants, through some stiff and stilted "course of studies." While opportunities are freely provided for a thorough and full mastery of each branch of useful learning, the student is exhorted to study carefully his own capacity and needs; to choose, with serious and independent consideration, the branches which will best fit him for his chosen work, and to pursue them to such extent as he may be able.

It is expected that each student will pursue studies in three or more departments at the same time, in order to fully employ his time. But, on special request, he may give his whole time to any one department, if the studies and practice in that department will afford him full employment.

In the appendix will be given several combined courses of studies, to aid the student to select such a course as may best fit him for his chosen profession or pursuit in life. These courses are given simply as hints to guide the inexperienced, and must by no means be understood as restricting the entire liberty of choice which is a fundamental idea of the University.

DEPARTMENT OF CHEMISTRY.

The course in this department will occupy four years, and is designed to make students at home in the applications of chemistry to agriculture, and the arts and manufactures; in a word to make them thorough chemists.

FIRST YEAR.—*First Term.*—Inorganic Chemistry. *Second Term.*—Organic Chemistry. *Third Term.*—Qualitative Analysis—detection of the alkalies the alkaline earths, the earths, the metals, the mineral acids, and the organic acids. Use of the blow pipe and the spectroscope. Descriptive Mineralogy. Instructions on the subject will be given by lectures, and the students will have practice in determining minerals.

SECOND YEAR.—*First Term.*—Qualitative Analysis—a series of substances for practice in the detection and separation of the elements. Practice in Mineralogy continued. *Second Term.*—Quantitative Analysis—salts, minerals, ores, alloys, furnace products, etc. Practice in Mineralogy continued. *Third Term.*—Quantitative Analysis, of soils, manures, ashes of plants, mineral waters, etc. Practice in Mineralogy continued.

THIRD YEAR.—*First Term.*—Quantitative Analysis continued. Assaying. Volumetric Analysis. *Second Term.*—Organic Analysis. Detection and separation of organic acids and bases, and other organic compounds. *Third Term.*—Quantitative Organic Analysis: 1st, of compounds containing carbon and hydrogen; 2d, of compounds containing carbon, hydrogen and oxygen; 3d, estimation of nitrogen, sulphur, chlorine, bromine and iodine in organic compounds.

FOURTH YEAR.—*First Term.*—Preparations of Chemicals. *Second Term.*—Chemistry applied to the arts of dying, bleaching, calico printing, electrotyping and photographing. *Third Term.*—Lectures on the manufacture of glass and procelain, the smelting of ores. Heating and illumination.

DEPARTMENT OF NATURAL HISTORY.

The course in this department extends through four years.

FIRST YEAR.—*First Term.*—Structural and Physiological Botany. Form, arrangement, structure, morphology, growth and office of the leaves and flowers; forms, growth and office of stem and root; cellular tissue, cell development, cell contents and cell transformations. Structure, parts and uses of seeds and fruit; and the food, nutrition and reproduction of plants. The whole illustrated by living and dried specimens and drawings. Also, enough of Systematic Botany to enable the general student to analyze the flowering plants. *Second Term.*—Systematic Botany in lectures: 1st, the natural orders, their extent, *properties, uses and distribution*; 2d, use of the microscope.

Vegetable Physiology continued. Chemistry of plants and of their food. Fungi and vegetable diseases, and outlines of the classes. Distribution and reproduction of the Cryptogamia. Two lectures a week. *Third Term.*—Systematic Botany. Practical collection and examination of the flowering and flowerless plants from all parts of the State as far as practicable. Botanical excursions and surveys.

SECOND YEAR.—*First Term.*—Principles of Zoology—development, structure, classification and distribution of animals. *Second Term.*—Systematic Zoology in lectures: 1st, natural orders, families, etc.; 2d, Embryology and and peculiar modes of reproduction; alternate generation; Comparative Anatomy as applied to clasification. Collection and preservation of specimens, and Natural History of domestic animals. *Third Term.*—Entomology; clasification of insects; habits of those injurious to vegetation, with means of checking their ravages. Habits of beneficial species.

THIRD YEAR.—*First Term.*—Zoology—General Physiology. Comparative Anatomy and Veterinary Surgery. *Second Term.*—Principles of Geology. *Third Term.*—Lit hological Geology—sources and materials of mineral wealth; building stones; mineral veins. Palæontology.

FOURTH YEAR.—*First Term.*—Historical and Dynamical Geology. Palæontology. *Second Term.*—Physical Geography and Meteorology, *Third Term.*—Special Geology of Illinois—Method of conducting surveys. Practical excursions.

DEPARTMENT OF AGRICULTURE.

This department will ultimately be divided into two:

1. The Department in General Agriculture.
2. The Department in Horticulture, Fruit Growing, Landscape Gardening.

The aim of the courses will be to fit students to manage successfully, for themselves or others, agricultural and horticultural estates and enterprises. The studies will be pursued partly by lectures, accompanied by courses of reading and examinations, and partly by the regular study of text books. Practical exercises and experiments on the farm, and in the gardens, nurseries, and fruit plantations, will constitute a part of the course.

It is designed to arrange, from the studies connected with agriculture, several distinct courses, one to occupy two years, one three years, and the third four years. Students may take either, at their option, or may select studies from either, but a student having made his selection, is not expected to change during the term.

The following presents the full course of studies in this department:

FIRST YEAR.—*The Farm.*—Its measurements and mapping; sub-divisions—meadows, pastures, orchards, woodlands, gardens, etc. Fences, hedges, farm buildings. Soils—classification and mechanical treatment of soils, plowing, etc. Drainage. Plant culture—Structure and Physiology of plants; classes of the useful plants, their characteristics, varieties, habits and values. Wheat culture, maize culture, grass culture, root culture, fruit culture begun, apples, pears, peaches, etc.

Related Studies.—Structural Botany. Inorganic Chemistry. Vegetable *Physiology.* English Language.

COND YEAR.—*The Farm.*—Chemical elements and chemical treatment of Fertalizers—their composition, manufacture, preservation and applica- Climate, influence of light, heat, and electricity on soils and vegetable th. Farm Implements—principles of structure and use. Road making. t culture—modes of propagation, production of new varieties, diseases of trees. Insects injurious to vegetation. Animal husbandry—breeds and ties of neat cattle, horses, sheep, and swine. Principles of breeding, ng, training, fattening, etc. Chemical composition of food, and prepara- of the several varieties. Sheep husbandry. Poultry. Bees.

lated Studies.—Trigonometry, Chain Surveying and Mensuration. Ge- rical Drawing. Topographical Drawing. Vegetable Economy. Chem- . German.

IRD YEAR.—*Agricultural Economy.*—Relation of agriculture to the other tries and to commerce. The several branches of agriculture. Agricul- book keeping, the farm book, herd book, etc.

lated Studies.—General principles of Geology. Local and agricultural gy. Theoretical Agriculture. Compass Surveying and Leveling. of farm surveys. French.

URTH YEAR.—*Rural Law.*—Of tenures and conveyances of land, of ways, of cattle, of fences, of noxious weeds, etc. Veterinary surgery and cine. Landscape gardening, and laying out of large farming estates. l architecture and engineering. Foreign agriculture. History and ture of agriculture.

lated Studies.—English Literature. Inductive Logic. Animal Physi- r. Entomology. Meteorology. Physical Geography. Political Economy.

DEPARTMENT OF PURE MATHEMATICS.

e studies of this department extend through three years. Those of the year belong properly to the preparatory course, and should, when icable, be completed before entering, by those who wish to take either of aller courses in the University.

ST YEAR.—(Preparatory.)—*First Term.*—Geometry, first four books of dre. *Second Term.*—Geomerty completed through eighth book. *Third* —Algebra. Davies' Bourdon—Chapters VII-IX.

COND YEAR.—*First Term.*—Trigonometry. Special Geometry. *Second* —Trigonometry one-third term. Analytical Geometry two-thirds term. *l Term.*—Analytical Geometry completed.

IRD YEAR.—*First Term.*—Higher Algebra. *Second Term.*—Differential dus. *Third Term.*—Integral Calculus.

ARTMENT OF NATURAL AND MECHANICAL PHILOSOPHY AND ASTRONOMY.

e course in this department will occupy four years, and will be pursued the use of text books, combined with lectures, and practical investiga- of the several subjects.

ST YEAR.—*First Term.*—Natural Philosophy—Properties of Matter, , *Gravity, Falling Bodies,* Pendulum, Motion, Projectiles, Hydrostatics

and Hydraulics, etc. Mechanical Drawing. *Second Term.*—Natural Philosophy—Pneumatics, Barometer, Pumps, Steam Engine, Acoustics, Optics, Electricity, etc. Mechanical Drawing. *Third Term.*—Mechanics. Drawing.

SECOND YEAR.—*First Term.*—Heat—Steam and its applications, Steam Engine, its theory, construction, history, etc. Air Engines, and drafts of Engines. *Second Term.*—Electricity, statical, dynamical, Terrestial Magnetism, Construction and use of Telegraph, Theory of Electroplating, etc., Acoustics, Laws of Sound. *Third Term.*—Optics, Theories of Light, Polarization, Telescopes, Microscopes, Mathematics of, etc.

THIRD YEAR.—*First Term.*—Practical Hydraulics—flow of liquids in pipes, pressure, etc. Hydrostatics, Motors, Practical Pneumatics, Friction, etc. *Second Term.*—Machinery—theory, construction, location, calculation of power, motors. *Third Term.*—Building materials, strength of materials, designs and estimates for mills, machinery, etc.

FOURTH YEAR.—*First Term.*—Astronomy—Solar System, Descriptive Astronomy. *Second Term.*—Stellar System, Meteorology, etc. *Third Term.*—Practical Astronomy, calculations of eclipses, use of instruments.

DEPARTMENT OF CIVIL ENGINEERING.

The studies in this department will occupy three years, and the instructions will be as follows:

FIRST YEAR.—*First Term.*—Chain Surveying, Mensuration, Geometrical Drawing. *Second Term.*—Descriptive Geometry, Geometrical Drawing. *Third Term.*—Compass and Transit Land Surveying, Leveling Plats, Maps of Farm Surveys.

SECOND YEAR.—*First Term.*—Topographical Surveying, Elements of Hydrographical Surveying, Leveling, Maps of Topographical Surveys. *Second Term.*—Mahan's Civil Engineering, Plans and Elevations of Engineering Constructions. *Third Term.*—Gillespie's Roads and Railroads. Railroad and Canal Surveying, Plans, Profiles and Sections of Surveys.

THIRD YEAR.—*First Term.*—Descriptive Geometry applied to Stone Cutting, Projections of the Earth, Warped Surfaces. Mathematical Theory, and results of Experiments upon the Strength of Materials, and of the Stability of Girder, Suspension, Tubular and Arch Bridges, and of Retaining Walls and Frames. Plans and Elevations of Engineering Constructions. *Second Term.*—Supply and Distribution of Water, Distribution of Gas, Drainage. Theory of Machines, Plans and Elevations of Engineering, Constructions. Machine Drawing. *Third Term.*—Method of determining the form of the Earth. Methods of the United States Coast Survey. Designs and Reviews of Special Machines, and Engineering Constructions. Discussion of Scientific Subjects. General Field Work.

The first year of the above course corresponds with the second year of the Mathematical course.

DEPARTMENT OF ENGLISH LANGUAGE AND LITERATURE.

The studies of this department will extend through three years. The instruction will be given by text books and lectures, with exercises in Compo-

sition, Essays, Forensics, Presentation and criticism of plans. Declamations throughout the course.

First Year.—*First Term.*—Advanced Grammar, and the grammatical analysis of authors, etc. *Second Term.*—Principles of Punctuation, use of Capitals, etc., English composition. *Third Term.*—Grammatical and philological analysis of Milton and other authors, with history of their times and contemporaries.

Second Year.—*First Term.*—Grammatical and philological analysis of Shakespeare and earlier Dramatists, History of the times and contemporaries of Shakespeare. *Second Term.*—Grammatical and philological analysis of Chaucer and Spencer, and history of their times, etc. *Third Term.*—History of English Literature.

Third Year.—*First Term.*—History of English and American Literature of the 19th century. *Second Term.*—Rhetoric—Invention—Plans for Essays, etc. *Third Term.*—Elements of Criticism—Methods of Philological study, etc.

DEPARTMENT OF THE FRENCH LANGUAGE AND LITERATURE.

The course of instruction in French will extend through three years, but students who desire to pursue the language only far enough to enable them to read the scientific works which they may find it ncessary to consult, are expected to acquire sufficient for this in a single year. The reading room will be supplied with French agricultural and scientific journals, which will be used in instruction as soon as the advancement of the student allows.

First Year.—Robertson's Grammar, Fasquelle's Colloquial French Reader, McGill's French Reader.

Second Year.—Telemaque, Charles XII, and modern French authors, Arnoult's French Grammar.

Third Year.—Classic and modern French authors, De Vere's Advanced French Grammar for reference, History of French Literature.

DEPARTMENT OF GERMAN LANGUAGE AND LITERATURE.

The course in German will extend through three years. The first year is expected to prepare students to read such German scientific books as they may need or desire to consult. The second year's instruction will be so conducted as to enable students to complete their mastery of the language and give German students an opportunity to acquire a perfect knowledge of their native tongue.

First Year.—German Grammar and Reader, German Classic Reader. One exercise a week in reading German agricultural and scientific papers.

Second Year.—Classic Reader, Schiller's William Tell, Goethe's Iphigenia. Conversation and Composition.

Third Year.—History of German Language and Literature, by Vilmar. Kohlrauchs Geschichte des *deutschen* Volkes. Conversation and Composition. *Reading of scientific journals* in the several branches.

DEPARTMENT OF THE LATIN LANGUAGE AND LITERATURE.

The course of instruction in this department will extend through three years, and will, at every stage, include a careful attention to the subject matter of the authors read in connection with the study of the language. A preliminary year is also provided in order to meet the present wants of students. This year is not considered a part of the regular course, and is to be dropped as early as practicable. Students will not be admitted to this department who are not prepared to enter at once upon the reading of Cæsar. For this purpose, a satisfactory knowledge of the Latin Grammar and Reader is required.

[PRELIMINARY YEAR.—Four books of Cæsar's Gallic war; Sallust's Conspiracy of Catiline; Ancient Geography of Europe, and chapters 64, 65 and 66 of Liddell's Rome.]

FIRST YEAR.—*First Term.*—Three orations of Cicero against Catiline Latin Prose Composition begun and continued through the course. Chapter. 67 to 71 inclusive of Liddell's Rome. *Second Term.*—Fourth oration against Catiline. Oration pro lege Manilia, and pro Archia Poeta. Political constitution of Rome. *Third Term.*—Selections from Virgil. Latin Prosody.

SECOND YEAR.—*First Term.*—Selections from Livy. Chapters 28–35 and 46 of Liddell's Rome. *Second Term.*—Livy continued Horace begun. Chapters 38–45 Liddell's Rome. *Third Term.*—Selections from Horace and Juvenal, Geography of the Countries bordering on the Mediterranean.

THIRD YEAR.—*First Term.*—Cicero De Officiis. Lectures on the History of Roman Literature and Philosophy. *Second Term.*- Cicero De Oratore. Lectures on the origin and structure of the Latin language. *Third Term.*—Freize's Quintillian. Lectures continued. Other authors will occasionally be substituted in place of some of the above.

DEPARTMENT OF GREEK LANGUAGE AND LITERATURE.

This course will also occupy three years, and the instruction will resemble that in the Department of Latin.

FIRST YEAR.—Harkness' First Greek book. First three books of Xenophon's Anabasis Greek Prose begun.

SECOND YEAR.—Herodotus, Demosthenes, Thucydides, Homer's Iliad.

THIRD YEAR.—Xenophon's Memorabilia of Socrates. Selections from Plato and the Greek Poets.

Select portions of Smith's History of Greece will be read in course, and lectures given on the Grecian History, Literature and Philosophy.

DEPARTMENT OF HISTORY AND SOCIAL SCIENCE.

The study of this department will extend through three years. The instruction will be given partly with text books, but chiefly by lectures with

systematic readings of specified authors and daily examinations on the same. The study of historical geography will keep even pace with the history studied, and the chronology will be rendered as clear and distinct as possible. Written exercises on chronology, and essays in historical criticism will constitute prominent features of the course.

FIRST YEAR.—*First Term.*—Discovery, settlement and colonial history of United States, with notice of other American States. American geography Two lectures (or lessons) a week. *Second Term.*—History of the United States from the time of the Revolution. Two lectures (or lessons) a week. *Third Term.*—Political Economy. Five lessons a week.

SECOND YEAR—*First Term.*—Ancient history of Greece and Rome with notices of other ancient nations. Ancient Geography. Five lessons (or lectures) a week. *Second Term.*—Medeiæval history, with history of christianity and ancient schools of philosophy Scholasticism. Five lessons (or lectures) a week. *Third Term.*—Modern history—general European history. European geography. Five lessons (or lectures) a week.

THIRD YEAR. *First Term.*—Constitutional history of England, and of the United States. Two lectures a week. *Second Term.*—History of civilization Analysis of historical forces and phenomena. Notices of the history of the arts and inductive sciences. *Third Term.*—Political philosophy. Constitutional and international law.

COMMERCIAL DEPARTMENT.

The course in this department will occupy one or two years, according to the time the student may give to the special studies of the department.

First Term.—Book-keeping by single and double entry for sole trader—applied to farming, mechanic and mercantile accounts. Theory of the several principal and auxiliary books. Theory of journalizing. Penmanship. Commercial calculation.

Second Term.—Partnership business. Commission and shipping accounts. Railroad books. Manufacturing accounts. Farm books. Herd and stock books. Business forms and papers. Notes. Endorsements. Drafts. Bills of exchange, inland and foreign. Bills of lading. Accounts current. Accounts sales. Inventories, invoices, receipts, etc. Commercial correspondence.

Third Term.—Banking and insurance. Commercial customs. Commercial law. Currency and exchange. Political economy applied to trade, markets, etc. Commercial geography. History of commerce.

DEPARTMENT OF MILITARY TACTICS AND ENGINEERING.

FIRST YEAR.—*First Term.*—Infantry Tactics—Schools of the Soldier and Company; Squad and Company Drills. Reports and Returns required from Company Commandants. *Second Term.*—Infantry Tactics—School of the Battalion. Instruction for Skirmishers. Reports and Returns required from Battalion Commandants. *Bayonet Fencing.* *Third Term.*—Infantry Tactics—*Evolutions of a Brigade.* *Reports* and Returns required from Brigade

Commandants. Skirmish and Battalion Drills. Guard-mountings, Inspections, Escorts, Funeral Honors.

SECOND YEAR.—*First Term.*—Artillery Tactics in the different Schools. Artillery Drills. Reports and Returns required from Artillery Officers. *Second Term.*—Cavalry Tactics in the different Schools. Reports and Returns required from Cavalry Officers. Sword Fencing. *Third Term.*—Evolutions of a Division, and of a Corps, in the different Armies. Reports and Returns required from Division and Corps Commandants. Forms for Parade and Review of a Division and of a Corps. The Essential Principles of Strategy and Grand Tactics. Advanced Guard, Outpost and Detachment Service of Troops. History of the most remarkable Epochs in the Military Art. Infantry and Artillery Drills.

THIRD YEAR.—*First Term.*—Field Fortifications. Descriptive Geometry applied to Drawing Fortifications. Duties of Staff Officers. Plans, Profiles and Sections of proposed Works. *Second Term.*—Permanent Fortifications. Theory of Gunnery, and Results of Experiments. Plans, Profiles, Sections and Drawings of proposed Works. *Third Term.*—Jomine's Art of War. Duane's or Mahan's Manual for Engineer Troops, consisting of Pontoon Drill, Practical Operations of a Seige, School of the Sap, Military Mining, Construction of Batteries. Cullom on Military Bridges. Benet's Military Law. Army Regulations.

The three years, or any two, may be taken in one, if the student is properly prepared in other studies.

DEPARTMENT OF MENTAL AND MORAL SCIENCE.

The studies in this department will occupy one year. The instruction will be given by lectures, combined with reading selected portions from specified authors, and examinations on the topics discussed.

First Term.—Mental philosophy—definitions and classification of mental phenomina. Connections and relations of mind and matter. Theories of perception. Phenomena of consciousness. Doctrines of ideas. Theory of mental culture. Three lectures a week.

Science of education, or mental philosophy applied to education. Two lectures a week.

Second Term.—Moral philosophy—connection of moral and mental philosophy. Theories of moral obligation. The moral powers. Practical ethics. Three lectures a week. Logic. Two lectures a week.

Third Term.—History of philosophy. Modern schools of philosophy. Inductive logic. Three lectures a week.

LECTURE COURSES.

It is a part of the plan of the University to provide courses of lectures in special departments of knowledge and art. These lectures will be given by regular members of the Faculty, or by eminent scholars and authors whose services may be secured for this purpose. Dr. John A. Warder, the eminent

American pomologist, has already accepted an appointment, and will deliver, during the winter term, a course of lectures on fruit growing, etc. Rev. Edward Eggleston, an eminent writer and editor, is also under appointment as lecturer on English Literature, and negotiations are in progress to secure other lecturers.

A weekly lecture is delivered to all the students, on manners, formation of habits and character; on the conditions of health, happiness, and success in life; on the general duties and affairs of life; on methods of study, courses of reading, etc.

AGRICULTURAL LECTURE SESSION.

It is also designed to hold at the University, each winter, a lecture session of two weeks, for several courses of lectures on the several branches of Agricultural and Horticultural science, to be delivered by gentlemen of eminent acquirements and experience in these departments. Due notice of the time of this course will be given. It is hoped and expected that these lectures will bring together a large number of the practical farmers and fruit growers of this and adjoining States, and that discussions of great value will follow the several lectures. Arrangements will be made to provide board at reasonable rates, and comfortable quarters, for as many as may attend.

APPARATUS OF INSTRUCTION.

A costly set of philosophical and chemical apparatus has just been received from the celebrated manufactory of E. S. Richie & Son, Boston, and large additions will be made at an early day. Rooms are set apart for a good working laboratory for the students in analytical chemistry, which will be fitted up under the direction of the Professor in Chemistry.

Valuable collections have already been secured for cabinets, in Mineralogy, Botany, Conchology, Geology, Palæontology, and in several departments in Zoology; and Prof. Powell, of the Chair of Natural History, is now absent in charge of a scientific expedition to the region of the Colorado of the North, making additional collections.

The illustrative apparatus in the Departments of Agriculture is designed to be very full and complete. The University owns over one thousand acres of improved farming lands, equal to any in the State. Forty acres are set apart for gardens, nurseries, and specimen orchards. The remainder are to be used for experimental and stock farms, orchards, arboretum, etc, Through liberality of manufacturers, the University is rapidly accumulating a collection of agricultural implements; and cabinets and drawings of specimen fruits, vegetables, etc., will be added as fast as practicable. The ornamental grounds around the building already contain a large variety of evergreens and flowering plants.

A collection of maps, charts, models and engravings, is also begun, and is being steadily increased by donation or purchase.

THE UNIVERSITY UNIFORM.

Under the authority of the act of incorporation, the Trustees have prescribed that all the students shall wear the University uniform. This uniform consists of a suit of cadet-gray mixed cloth, of the same color and quality as that worn at West Point, and manufactured by the same establishment.

The coat is a single-breasted frock, buttoned to chin, with standing collar, and a trimming of black mohair cord on shoulders, in loops. The vest is also single-breasted, buttoned to chin, with standing collar. Buttons for coat and vest are manufactured purposely for the University. They are gilt, of medalion style, the design being a sheaf of wheat surrounded with the words, "Illinois Industrial University." The pants have a welt of dark blue in the outside seams. The suit is a very tasteful dress, and is substantial and enduring. An arrangement has been made with responsible parties to furnish the suits to students at twenty-seven dollars each. Students can procure them ready made on their arrival here.

The University cap is of dark blue cloth, and ornamented with the initials I. I. U., surrounded by a silver wreath in front.

The arms and equipments used in the drill are furnished by the State.

Students will wear their uniform always on parade, but in their rooms, and at recitation, may wear other clothing. An army blouse, or fatigue dress, will be furnished at low rate to those that want it.

CHOICE OF STUDIES.

Entire liberty of choice is allowed each student, in selecting the departments which he will enter and the studies he will pursue. It is expected that students will ordinarily pursue the studies of two or more departments at the same time. Each student is required to have fifteen lessons a week, unless specially excused for cause. Changes from one department to another can only be made at the opening of a term.

REQUIREMENTS FOR ADMISSION.

1. Each student is required by law to be at least *fifteen years* of age, but it is believed that few will be found mature enough at this age to enter with the highest profit upon the studies of the University, and it is recommended as a general rule, that students be at least eighteen years old before entering.

2. The law also prescribes that "no student shall be admitted to instruction in any of the departments of the University, who shall not previously undergo a satisfactory examination in each of the branches ordinarily taught in the common schools of the State." In addition to these, candidates for any particular department will be examined in such studies as may be necessary to fit them to pursue successfully the course in that department.

The chief aim of all examinations for admission to the University is to ascertain the student's preparation to pursue successfully the studies of the course. Hence, thoroughness, and a general knowledge of the subject, will be accounted as of more importance than the amount studied. A student of

earnest purpose and well disciplined mind will often pursue a new study more successfully than one of much more extensive preparation, but of less discipline and diligence. Much more solicitude is felt about the progress of the student after he enters, than about the preparation made before he enters, the University. Frequent and searching examinations will be held to test the progress in study, and to determine each student's fitness to remain in the classes. The University cannot be held responsible for the lack of thoroughness in the common school studies of its students, but will insist upon thoroughness in its own proper studies.

THE LABOR SYSTEM.

Practice in some form, and to some extent, is indispensable to a practical education. It is the divorcement of the theoretical and practical which renders so much of education mere "book learning." To guard against this fatal defect, the trustees have directed that the manual labor system shall be thoroughly tried, and all students, who are not excused on account of physical inability, are required to labor from *one* to *two* hours each day, except Saturday and Sunday. During the autumn the labor occupied only one hour a day. The students go out in squads, under their military officers, and under the general supervision of members of the faculty, or superintendents of the departments.

The labor is designed to be educational, and to exhibit the practical applications of the theories taught by the text books and in the lecture room. Thus far it has been popular among the students, several attributing to it the preservation of their health through a long term of severe study. They have already accomplished a large amount of valuable work, and are proud to point to the grounds fenced, planted with trees, and ornamented by their own labor. It is found to facilitate, rather than hinder study, and affords a much more valuable means of physical culture than any system of gymnastics.

The labor is compensated in proportion to the ability and fidelity of each laborer, the maximum compensation being eight cents an hour. Many students voluntarily work over hours, and receive for such overwork twelve and a half cents an hour. The experience of the past confirms the belief that this union and alternation of mental and muscular effort will not only give the "sound mind in a sound body," but will help to produce educated men who will be strong, practical and self-reliant, full of resource, and practical in judgment, the physical equals of the strongest, and the mental peers of the wisest; thus redeeming higher education from the odium of puny forms and pallid faces, and restoring the long lost and much needed sympathy between educated men and the great industrial and business classes.

It is not expected that all prejudices against work will disappear at once, or that labor will at once assume for all, its position of native dignity and honor; but we may confidently hope, if the increasing numbers do not render it impracticable to furnish profitable employment, finally to overcome the strongest prejudices, and render the labor system one of the most popular features of the University, with the public as well as with the students themselves.

HONORARY SCHOLARSHIPS.

The Legislature prescribed that one honorary scholar shall be admitted from each county in the State. These scholarships, which are designed "for the benefit of the descendants of soldiers and seamen who served in the armies and navies of the United States during the late rebellion," entitle the incumbents to free tuition. The trustees have also authorized the faculty of the University to remit the tuition of worthy young men whose circumstances are such as to require this aid.

PRIZE SCHOLARSHIPS.

A movement has been started to secure in each county of the State the endowment of a prize scholarship, with a permanent fund of $1,000 for each. The plan contemplates that the income of this fund shall be annually awarded to the best scholar from the public schools of the county, who shall present himself as a candidate for the University. The scholarship shall be determined by a competitive examination, to be held in each county, under the Regent of the University, and the State Superintendent of Public Instruction. The examinations will be held the first Friday in September, or at such time and place as the county superintendent of schools may appoint. Honorary scholars will be examined at the same time. Only a few of the counties have as yet provided for the prize scholarship, but it is hoped that a prize of greater or less amount will be provided in each county in which a worthy candidate shall be selected.

STUDENTS' DORMITORIES AND BOARD.

There are in the University building about sixty private rooms for students, which are rented to the students who first apply. Each room is designed for the accommodation of two students. These rooms are fourteen feet long and ten feet wide. They are without furniture, it being deemed best that students shall furnish their own rooms. It is earnestly recommended for health's sake that each student have a separate bed. A narrow bedstead and mattress, with suitable clothing, shall be provided by each. A study table, chairs, and a small coal stove, may be provided in common by the occupants of the room.

Good private boarding houses are already springing up around the University, where either day board, or board and rooms can be obtained, with the advantages of the family circle. Several students have provided themselves with meals in their rooms, at an expense varying from $1 to $1 50 per week.

To avoid unnecessary litter about the grounds, coal is purchased by the University at wholesale, and furnished to students at cost.

HOW TO ENTER THE UNIVERSITY.

In answer to the questions often received, the following explicit directions are given to young men wishing to enter the University:

1st. If you are over fifteen years of age, of good habits, and have a fair

knowledge of the common school branches, Arithmetic, Grammar, Geography, and History of the United States, you may enter, and take any course of study you are prepared for. The further advanced in study, the better you will be prepared to secure the full advantages of a residence at the University.

Some of the Departments require more preparation than others.

2d. You should enter at the beginning of a term; but you may enter at any other time if prepared to go forward with any of the classes.

3d. If doubtful of your ability to enter the departments you have selected, write to the Regent, J. M. Gregory, Champaign, and state what branches you have studied, the progress you have made in each, and your wishes as to course and term of study.

4th. If prepared, come on at once, bringing with you, if practicable, a letter of recommendation from your last teacher, or county superintendent of schools, or any good citizen.

HOW CAN I PAY MY WAY?

In answer to this question which often reaches us from earnest young men, eager for an education, but without means, we reply:

1st. Your necessary expenses (except for books and clothing,) will be as stated on the next page, under the head of "Expenses."

2nd. During the Spring and Fall terms, and to some extent during the Winter term, you can find work on the University farm and gardens, or in the shops, for which you will be paid 12½ cents per hour, if diligent and faithful. You can easily, without hindering your studies, work three hours a day, and if needful the whole day, on Saturdays. This will amount to $3 12½ per week, and will, if you choose to board yourself, more than cover all your expenses. If you understand some common trade, you can do still better. You will easily be able to earn, during the vacation, enough to buy your clothes and books. Some students pay their way, and have money to spare.

If possible you should have, to start with, money enough to pay your entrance fee and bills, and to buy your half of the furniture of your room, which will cost, say $15. Your uniform will cost you $27; but this will save you from purchasing other clothing to start with. You will find numbers of fellow students, who are taking care of themselves, and who will, with true brotherly feeling, advise and assist you. Come on without fear. What man has done, man can do.

TERMS AND VACATIONS.

The college year is divided into three terms of twelve weeks each. The work of the term will in all cases commence on Monday morning, and students who fail to be present at the opening will be expected to make up, by private study, every lesson which may have been passed over by their classes. Examination of new students will be held the Saturday preceding the opening of the term.

The only vacations are, the holiday recess, including Christmas and New Years, a vacation of *one week between* the winter and spring term, and the *long vacation at the close of the* third term.

CALENDAR FOR 1869–'70.

Winter term closes	March 6th,	1869.
Spring " opens	March 15,	"
Spring " closes	June 5,	"
Fall " opens	Sept. 13,	"
Fall " closes	Dec, 4,	"
Winter " opens	Dec. 6,	"
Winter " closes	March 5,	1870.
Spring " opens	March 14,	"
Spring " closes	June 4.	"

EXPENSES.

Tuition to Illinois students	$15 00	per annum.
Tuition to foreign students	20 00	"
Fee for incidentals	2 50	per term.
Room rent for each student	4 00	"

Room rent is only charged to students who room in the University building. Each student is required to pay a matriculation fee of $10 on first entering the institution. This entitles him to membership till he completes his studies. Honorary and prize scholars pay no tuition fee, but pay all other fees. All bills due the University must be paid, and the treasurer's receipt be shown to the Regent, before the student can enter the classes. Students boarding in University Hall will be required to deposit with the steward $10 each, to apply on their board bills at the close of the term.

The annual expense of a residence at the University, exclusive of books and clothing, will be nearly as follows:

Tuition, room rent, and incidentals, from	$34 50	to	$39 50
Board in Hall	108 00	to	126 00
Fuel and lights	10 00	to	15 50
Washing, 75c. per dozen	10 00	to	15 00
Total	$163 00		$195 00

Many young men reduce the expense to within $100 a year, and pay this by their labor during the year. It ought to be known that *any young man can pay his way through college* who is willing, for the sake of an education, to practice steadily the virtues of industry and economy.

GOVERNMENT.

The University is designed for *men*, not *children*, and its government rests in an appeal to the manly feeling and sense of honor of its students. It has but one law, and that is, "DO RIGHT." If any student shall show himself so weak or corrupt that he can not, when thus treated, refrain from vicious conduct, he will receive permission to leave the institution, where his presence

can only injure others, without being of any benefit to himself. But no pains will be spared to counsel the inexperienced, to admonish the careless, and to save the tempted. Especially will it be an object to establish and maintain that high toned, refined, and honorable public sentiment, which is at once the best safeguard against meanness and vice, and a constant inspiration to nobleness and virtue.

DONATIONS.

In addition to the donations heretofore acknowledged, the officers of the University take pleasure in acknowledging the following:

Hon Lyman Trumbull, Hon. John A. Logan, Hon. S. M. Cullom, congressional documents and speeches.

J. Davis Wilder, Chicago, 8 yards paper black board.

Edgar Sanders, Florist, Chicago, several flower bulbs.

A. Blumenschein, Florist, Chicago, collection of green-house plants.

T. A. E. Holcomb, South Pass, Ill., collection of Roses and green-house plants.

E. M. Potter, Kalamazoo, Mich., Potter's Three-horse Clevis.

Collins Co., Hartford, Conn., per H. H. Taylor, agent, Chicago, 1 cast steel plow with steel beam.

J. H. Pickrell, Harristown, Ill., 1 large and beautiful colored lithograph of group of Durham cattle.

Harper Brothers, Publisher's, New York, set of classical text books and histories.

D. Appleton & Co., Publishers, New York, several text books.

Sheldon & Co., Publishers, New York, several text books.

A. S. Barnes & Co., Publishers, New York, 1 set Mathematical and other text books.

John Burchard, Beloit, Wis., Gates and Castings for self-opening gates.

BOARD OF TRUSTEES.

OFFICERS AND INSTRUCTORS.

JOHN M. GREGORY, LL. D.,

REGENT, AND PROFESSOR OF PHILOSOPHY AND HISTORY.

WILLIAM M. BAKER, M. A.,

PROFESSOR OF ENGLISH LANGUAGE AND LITERATURE.

*GEORGE W. ATHERTON, M. A.,

PROFESSOR OF HISTORY AND SOCIAL SCIENCE, AND INSTRUCTOR IN LATIN.

J. W. POWELL, M. A.

PROFESSOR OF NATURAL HISTORY AND GEOLOGY.

WILLARD F. BLISS, M. A.,

PROFESSOR OF AGRICULTURE.

A. P. S. STUART, M. A.,

PROFESSOR OF THEORETICAL AND APPLIED CHEMISTRY.

——————— ———————

PROFESSOR OF HORTICULTURE.

——————— ———————

PROFESSOR OF MECHANICAL SCIENCE.

——————— ———————

PROFESSOR OF CIVIL AND RURAL ENGINEERING.

——————— ———————

PROFESSOR OF MATHEMATICS.

THOMAS J. BURRILL,

ASSISTANT PROFESSOR OF NATURAL HISTORY.

COL S. W. SHATTUCK, M. A.,

ASSISTANT PROFESSOR OF MATHEMATICS, AND INSTRUCTOR IN MILITARY TACTICS.

CAPT. EDWARD SNYDER,

ASSISTANT PROFESSOR OF BOOK KEEPING AND GERMAN.

JONATHAN PERIAM,

HEAD FARMER AND SUPERINTENDENT OF PRACTICAL AGRICULTURE.

NON-RESIDENT PROFESSORS.

JOHN A. WARDER, M. D., Cincinnati,

LECTURER ON VEGETABLE PHYSIOLOGY AND FRUIT GROWING.

EDWARD EGGLESTON, M. A.. Chicago,

LECTURER ON ENGLISH LITERATURE.

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LECTURER ON VETERINARY SCIENCE.

Resigned Jan. 1, 1869.

CATALOGUE OF STUDENTS.

SPRING TERM OF 1869.

Names.	Residence.		Nativity.
	City.	County.	
Edwin Fletcher Abbott.	Centralia.	Marion.	Wisconsin.
*Charles Edward Allard	Rossclare	*Hardin*	Indiana.
Benton Alfred.	Urbana	Champaign.	Illinois
*Wilbur Clinton Alvord.	Bement.	Piatt.	Massachusetts.
John F. Alexander.	Alex Stat.	Morgan.	Illinois.
*David Bally.	Champaign	Champaign	Illinois.
Herbert Osias Barber.	Rantoul.	Champaign	Illinois.
Delenson Elroy Barnard.	Kankakee.	Kankakee.	Indiana
Joseph T Beasley	Champaign	Champaign	Illinois
Louis Henry Beidler	Champaign	Champaign	Illinois.
George W. Brewer.	Champaign	Champaign	Illinois.
Frank Morgan Burroughs.	Champaign	Champaign.	New York.
Hiram P Blackburn.	Rossville.	Vermilion	Illinois.
James Frederick Blake.	Mount	Jo Davies	Illinois.
Milo Benedict Burwash.	Champaign	Champaign.	Canada E.
Thomas Nathaniel Burwash.	Champaign	Champaign.	Canada E.
*John Wilbur Busey	Champaign	Champaign.	Illinois.
Oscar Fred. Cady	Champaign	Champaign	Illinois.
James William Campbell.	Springfield.	Sangamon	Illinois.
Willis Smith Chase.	Chicago.	Cook.	N. Hampshire.
Cassius C. Clendemin.	Morrison.	Whiteside.	Illinois.
Thomas Benton Columbia.	Champaign	Champaign	Illinois.
William Harrison Crayne.	Urbana.	Champaign	Indiana
*Joseph Buchanan Dare.	Champaign	Champaign	Illinois.
John Jefferson Davies.	Freeport.	Stephenson	Illinois.
Joseph Martin Davidson	Tolono.	Champaign	Illinois.
*Frank Dexter Dole.	Mattoon	Coles.	Illinois.
Ira Bardwell Donaldson.	Morrison.	Whiteside	Illinois.
Henry N. Drewry.	Mason	Effingham	Indiana.
Henry Dunlap.	Champaign	Champaign	Illinois.
Ernest Sans Dunlap.	Champaign	Champaign	Illinois.
Herbert Eaton.	Philo	Champaign	New Jersey
Ernest Eaton	Philo	Champaign	New Jersey
Elias Quincy Emerson.	Champaign	Champaign	Massachusetts.
Charles S Emerson.	Mahomet.	Champaign.	Illinois.
John Leslie Evans	Decatur.	*Macon*	Illinois.
Charles Austin Falls	Urbana.	Champaign	Kentucky.
Alfred Murray Flagg.	Moro.	Madison	Illinois.
Cyrus David Fry.	Freeport.	Stephenson	Pennsylvania
*Fayette Gere.	Urbana.	Champaign	Illinois.
James E. Graham	Galena.	Jo Daviess.	Illinois.
*Charles Payton Graham.	Champaign	Champaign	Kentucky
James M. Goodspeed	Urbana	Champaign	Ohio
Charles Henry Hall.	Danville	Vermillion	Indiana.
William Townsend Hamar.	Champaign	Champaign	Indiana.
Miles Fayette Hatch.	Blivens' Mills.	McHenry	Illinois.
Edmund Brooks Hazard.	Lynden.	Whiteside.	Illinois.
Robert Harrison Haslett.	Springfield.	Sangamon	Illinois.
Edgar Lewis Hill	Watson	Effingham.	Illinois.
William H. Heurichsen.		Morgan.	Illinois.
Charles W. Hoxsey.	Mason.	Effingham.	Wisconsin.
William Hubbard.	Elgin	Kane.	Illinois.

CATALOGUE OF STUDENTS—CONTINUED.

Names.	Residence. City.	Residence. County.	Nativity.
Hulett.	Morrison	Whiteside	Ohio
...anklin Kirkpatrick	Champaign.	Champaign.	Illinois.
Julius Kraft	Bellville	St. Clair	Illinois.
Ladd.	Ringwood	McHenry	Illinois.
...field Lawver.	Freeport.	Stephenson	Illinois
...k Love	Sidney	Champaign	Ohio.
Lyman	Richland	Sangamon	Illinois
...nch	Wapella	Dewitt	England
...yon	Rockford	Stephenson	Massachusetts
...rtin	La Moille	Bureau	Illinois
...wton Mathews	Mason	Effingham	Indiana
McCarkle	Fairmount	Danville	Illinois.
... Montilius	Freeport	Stephenson	Illinois
...doore	Tolono	Champaign	New York
...lson.	Canton	Fulton	Illinois
...rris	Tolono.	Champaign	N. Jersey
Pancake.	Mahomet	Champaign.	Illinois.
...bua Parish	Raleigh	Saline	Illinois
Parker	Philo.	Saline	Massachusetts
...mon Parks	Urbana	Champaign	Ohio
...ies Patton	Paxton.	Ford	Illinois
...ris Payton.	Danville	Vermillion	Illinois
...arsons	Marshall	La Salle	Illinois
... Peacock	Chicago	Cook	Illinois
Phillips.	Chicago	Cook	Illinois
Porterfield	Sidney	Champaign	Pennsylvania
...wton Porterfield	Sidney	Champaign	Pennsylvania
Powell	Champaign	Champaign	Indiana
Pratt.	Mahomet	Champaign.	N. Hampshire
Lafayette Rader	Charleston	Cole	Tennessee
...art Raymond	Champaign	Champaign.	Ohio
...ert Reiss	Bellville	St. Clair	Illinois
...artin Randall	Yellowhead	Kankakee	Michigan
...very Reynolds.	Belvidere.	Boone.	Wisconsin
...dwin Richards	Springfield	Sangamon	Illinois
...y	Urbana	Champaign	Illinois
...arhardt Rigg	Champaign	Champaign	Pennsylvania
...esley Rolfe	Oswego.	Kendall	Illinois
...npson Romine	Urbana	Champaign	Illinois
...Roughton	Rantoul	Champaign	England
...nson Rowlen	Tolono	Champaign	Ohio
...ussell.	Urbana	Champaign	Illinois
...lliott Sale	Newcomb.	Champaign.	Ohio
...wyer	Tiskilwa.	Fulton	Illinois
...anchard Scripps	Astoria	Fulton	Illinois
...lgar Shinn	Urbana.	Champaign.	Illinois
...omas Shinn	Urbana.	Champaign	Illinois
...ilver	Urbana	Champaign	Ohio.
...allace Silver.	Urbana	Champaign	Ohio.
... Smith.	Peru.	La Salle	Illinois
...arrol Smith	Freeport	Stephenson	Pennsylvania
...exander Snelling	Kinmundy	Marion.	N. Hampshire
...ugustus Staples	Springfield	Sangamon	Maine
...ton Swinford	Paxton	Ford	Illinois
...Stoddert	Charleston	Coles	Illinois
...ber	Butler	Butler	Illinois
...vid Swearingen.	Champaign	Champaign.	Illinois
...win Swyer	Bellville	St. Clair.	Illinois
...ple	Woodstock	McHenry	Illinois
...rwilliger	Belvidere	Boone.	Illinois
...revett.	Champaign	Champaign	Illinois
...est Thompson	Homer	Champaign	Illinois
...dell Towle	Urbana	Champaign.	New York
... Warner	Salem.	Marion.	Illinois
...Thompson Weber	Raleigh	Saline	Illinois
...udson Westlake	Springfield	Sangamon.	Illinois.
...ton Wharton	Bement	Piatt	Pennsylvania
Walker	Champaign	Champaign.	Illinois
Wheeler	Versailles	Brown	Illinois
Wheeler.	Versailles	Brown	Illinois

CATALOGUE OF STUDENTS—CONTINUED.

Names.	Residence.		Nativity.
	City.	County.	
William*J. Weagley	Jacksonville		Illinois
Samuel Weaver White	Paxton	Ford	Ohio
James Alexander Williams	Urbana	Champaign	Illinois
Reuben O. Wood.	Woodburn	Macoupin	Illinois
Paul Way Woody	Champaign	Champaign	Indiana
Harley Wilburn Yeager	Monticello	Piatt	Illinois

*Absent this year.

The names of members who have been expelled, or who have left without permission, are omitted from this catalogue.

APPENDIX.

The following courses of combined studies are here presented to aid such students as may need some assistance in making out courses for themselves. It must be remembered that each study taught in the University must be confined to its regular terms, and any selection of studies must be made with constant reference to this fact. The terms in which each study will be taught, can be ascertained by a reference to the courses in the several Departments.

Other courses of study belonging to institutions of well-known fame, are added as affording valuable suggestions.

AGRICULTURAL COURSE.

Three Suggested Courses of Collateral Study in Agriculture, prepared by Prof. Bliss.

"Chemistry is the corner-stone of Scientific Agriculture-"—Dr. Jno. A. Warder.

"Without a knowledge of Physics, of Chemistry, and of Agricultural Geology in the widest signification, is no understanding of Plant and Animal Life to be gained. The Natural Seiences can never be learned *thoroughly*, that is, so that practical application of them can be made in life, from books or lectures. The student will grasp, understand, and assimilate mentally what he has learned and read only when he *makes Chemical Experiments, Physical Experiment, dissects Plants, and investigates aad observes for himself.* *Practical* knowledge is *thorough* knowledge. All *superficial* knowledge is *unpractical.* The farmer who wishes rational education, and does not devote at least a year exclusively and earnestly to the study of Physic, Chemistry, and Physiology, had better not pursue the Natural Sciences at all."—M. J. Schleiden.

The work laid down in the following courses is designed at once to supplement and explain the Lectures delivered from time to time on the various branches of Agriculture, and to afford such general education as is absolutely necessary to progress in any direction, and which must, for the present, be provided for students here, since they do not bring it with them.

Students desiring to remain but a single year and pursue special branches during that time, will be allowed to do so.

Persons wishing to spend the Fall and Winter terms of each year here, and the Spring term at home, will still be able to go on with their classes at the beginning of the *succeeding year,* though at some disadvantage.

A TWO YEARS' COURSE.

FIRST YEAR.—*First Term.*—Chemical Physics and Inorganic Chemistry. Structural and Physiological Botany. First four books of Davies' Legendre.

Second Term.—Organic Chemistry in text book, "How Crops Grow." Fifth book of Davies' Legendre. English Language.

Third Term.—Qualitative Analysis. Detection of the alkalies, alkaline-earths, earths, etc. Systematical Botany. Excursions and Collections. English Language.

SECOND YEAR.—*First Term.*—Qualitative Analysis continued. Detection and separation of the Elements. Chain Surveying and Mensuration. Geometrical Drawing. General Principles of Zoology (or German.)

Second Term.—General Principles of Geology. Vegetable Economy. How Plants Feed. Topographical Drawing. Animal Physiology, (or German.)

Third Term.—Geology of Illinois. Vegetable Economy. Entomology, (or German.)

THREE YEARS' COURSE.

FIRST YEAR.—*First Term*—Chemical Physics and Inorganic Chemistry in text books. Structural and Physiological Botany. First four books of Davies' Legendre.

Second Term.—Organic Chemistry in text books. Vegetable Physiology. Fifth book of Davies' Legandre. English Language.

Third Term.—Qualitative Analysis. Detection of the alkalies, alkaline-earths, earths, etc. Systematic Botany. Excursions and Collections. English Language.

SECOND YEAR.—*First Term.*—Qualitative Analysis continued. Detection and Separation of the Elements. Chain Surveying and Mensuration. Geometrical Drawing. German.

Second Term.—Quantitative analysis of salts, minerals, ores, alloys, furnace products, etc. Vegetable Economy. German.

Third Term.—Quantitative analysis of soils, manures, ashes of plants, etc. Vegetable Economy. German.

THIRD YEAR.—*First Term.*—General Principles of Zoology. Plane Trigonometry one-half term. Entomology. French.

Second Term.—Principles of Geology. Tillage and Manures. French.

Third Term.—Geology of Illinois. Compass Surveying and Leveling. French.

A FOUR YEARS' COURSE.

FIRST YEAR.—*First Term.*—Chemical Physics and Inorganic Chemistry in text book. Structural and Physiological Botany. First four books of Davies' Legendre.

Second Term.—Organic Chemistry in text books. Fifth book of Davies' Legendre. How Crops Grow. English Language.

Third Term—Qualitative Analysis. Detection of the alkalies, alkaline-earths, earths, etc. Systematic Botany. Excursions and Collections. English Language.

SECOND YEAR.—*First Term.*—Qualitative Analysis continued. Detection and Separation of the Elements. Chain Surveying and Mensuration. Geometrical Drawing. German.

Second Term.—Quantitative Analysis of salts, minerals, ores, alloys, furnace products, etc. Topographical Drawing. How Plants Feed. German.

Third Term.—Quantitative Analysis of soils, manures, ashes of plants, etc. How Plants Feed. German.

THIRD YEAR.—*First Term.*—Higher Physics. Plane Trigonometry one-half term French.

Second Term.—Principles of Geology. Tillage and Manures. French.

Third Term.—Geology of Illinois. Excursions and Collections. Compass Surveying and Leveling. Maps and Plats of Farm Surveys. French.

FOURTH YEAR.—*First Term.*—General Principles of Zoology. Inductive Logic. English Literature.

Second Term.—Animal Physiology. Stock Feeding and Dairy produce. Meteorology. English Literature.

Third Term.—Entomology. Political Economy. English Literature.

GENERAL COURSE.

FIRST, OR FRESHMAN YEAR.

	REGULAR STUDIES.	OPTIONAL AND EXTRA.
1ST TERM—	Trigonometry and Surveying.	
	Structural Botany.	
	Cicero's Orations against Cataline.	
	French.	Greek.
2D TERM—	Trigonometry and Analytical Geometry.	
	Systematic Botany.	
	Cicero's Orations.	
	French	Greek.
3D TERM—	Systematic Botany.	
	Analytical Geometry completed.	Greek.
	Geometrical Drawing.	
	French Literature.	
	Selections from Virgil.	

SECOND, OR SOPHOMORE YEAR.

1ST TERM—	Mechanics.	
	Chemistry. Zoology.	Livy.
	German.	Greek.
2D TERM—	Chemistry.	
	Entomology, etc.	Livy; Horace.
	Physics—Mechanics.	Greek.
	German.	
3D TERM—	Mineralogy.	
	Physic—Rhetoric.	
	German Literature.	Horace and Juvenal.

THIRD, OR JUNIOR YEAR.

1ST TERM—	Astronomy.
	Geology.
	English Literature.
	Ancient History.
2D TERM—	Geology
	Mediæval History.
	Meteorology.
	English Literature.
3D TERM—	Logic
	Physical Geography.
	Modern History.
	English Literature.

FOURTH, OR SENIOR YEAR.

1st Term—Mental Philosophy and Science of Education.
Constitutional History of England and of the United States.
Elements of Criticism.
2d Term—Moral Philosophy.
History of Civilization.
Civil Polity; Constitution of the United States.
3d Term—History of Philosophy.
Modern Philology.
Constitutional Law.
History of Inductive Sciences.

COURSE OF INSTRUCTION

IN MICHIGAN AGRICULTURAL COLLEGE.

FRESHMAN CLASS.

First Half Year.—Algebra, Robinson; History, Weber; Geometry Robinson; Book-keeping, Bryant & Stratton.

Second Half Year.—Trigonometry, Robinson; Surveying, Davies; Practical Agriculture; Geology, Dana.

SOPHOMORE CLASS.

First Half Year.—English Literature, Chambers, Spaulding; Botany, Gray; Elementary Chemistry, Youmans.

Second Half Year.—Entomology, Harris; Analytical Chemistry, Fresenius; Botany, Gray, Darlington, and Lindley; Horticulture.

JUNIOR CLASS.

First Half Year.—Physics, Snell's Olmstead; Agricultural Chemistry, Johnstone; Inductive Logic, Herschel.

Second Half Year.—Physics, Miller; Rhetoric, Whately; Day's Praxis; Animal Physiology, Dalton.

SENIOR CLASS.

First Half Year.—Zoology, Carpenter; Practical Agriculture; Mental Philosophy, Wayland; Astronomy, Snell's Olmsted; Landscape Gardening, Downing, Kemp.

Second Half Year.—Civil engineering, Mahan; Moral Philosophy, Haven; Political Economy, Carey, Walker; French, Fasquelle.

COURSE OF STUDY AND INSTRUCTION

IN THE MASSACHUSETTS AGRICULTURAL COLLEGE.

FRESHMAN YEAR.

FIRST TERM.—Algebra; Human Anatomy and Physiology; Chemical ıysics.
SECOND TERM.—Geometry; French; Chemistry.
THIRD TERM.—Geometry; French; Botany; Lectures upon Hygiene, ıemistry, Botany and Agriculture; and Exercises in Orthography, Elocution d English Composition, during the year.

SOPHOMORE YEAR.

FIRST TERM.—German; Agriculture; Commercial Arithmetic and Book-eping.
SECOND TERM.—German; Trigonometry; Analytical Chemistry.
THIRD TERM.—Mensuration; Surveying; Anaylitical Chemistry; Zoology d Drawing; Lectures upon Comparative Anatomy, Diseases of Domestic nimals, Organic Chemistry and Market Gardening; Exercises in English mposition and Declamation, during the year.

JUNIOR YEAR.

FIRST TERM—Physics; French or German; Agricultural Chemistry, rawing.
SECOND TERM.—Physics; Rhetoric; Horticulture.
THIRD TERM.—Astronomy; Systematic Botany; History of the United ates; Lectures upon Physics, Mineralogy, the Cultivation of the Vine, and ruit and Forest Trees, and Useful and Injurious Insects; and Exercises in nglish Composition and Debate, during the year.

SENIOR YEAR.

FIRST TERM.—Intellectual Philosophy; History; Physical Geography.
SECOND TERM.—Moral Philosophy; Political Geography; The Civil Polity Massachussetts and the United States.
THIRD TERM.—Geology; Engineering; Political Economy; Lectures upon ock Farming, Architecture, Landscape Gardening, Geology and English iterature; and Exercises in Original Declamation and Debate, during the ar.
Exercises in Gymastics, Military Tactics, and the various operations of the arm and Garden, through the course.

COURSE OF INSTRUCTION

N THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY.

FIRST YEAR.—Mathematics. *Algebra.* Solid Geometry. Trigonometry, lementary *Mechanics.* *Chemistry.* English. German. Descriptive Geom-ry. *Mechanical Drawing.* *Free-hand* Drawing.

SECOND YEAR.—Mathematics. Spherical Trigonometry. Analytical Ge etry of two and three dimensions. First Principles of the Differential Integral Calculus. Descriptive Astronomy. Surveying. Physics. Che try. English. French. German. Descriptive Geometry. Mechan Drawing. Free-hand Drawing.

THIRD YEAR.—1. *Course in Mechanical Engineering.*—Mechanism. Mat matics. Differential and Integral Calculus. Analytic Mechanics. Appl Mechanics. Descriptive Geometry. Drawing. Physic. Geology. Engli Constitutional History. French. German.

2. *Course in Civil and Topographical Engineering.*—Engineering. Mat matics. Applied Mathematics. Spherical Astronomy. Descriptive Ge etry. Drawing. Physics. Geology. English. Constitutional Histo French. German.

4. *Course in Mining Engineering.*—Engineering. Descriptive and] terminative Mineralogy Assaying. Quantitative Chemical. Analy Metallurgy. Mathematics Applied Mechanics. Drawing. Physic. G ogy. English. Constitutional History French German.

5. *Course in Building and Architecture.*—Architectural Design. Const tion. Drawing. Mathematics. Applied Mechanics. Descriptive Geome Physics. Geology. English. Constitutional History. French. Germa

6. *Course in Science and Literature.*—Mathematics. Chemistry. Phy Architectural Design. History. Drawing. Physcs. Geology. Engl Constitutional History. French. German.

FOURTH YEAR.—1. *Course in Mechanical Engineering,*—Machines.] tors. Building Materials. Descriptive Geometry. Drawing. Polit Economy. Natural History. French. German.

2. *Course in Civil and Topographical Engineering.*—Engineering. Mach ery and Motors. Building Materials. Descriptive Geometry. Drawi Political Economy. Natural History. French. German.

4. *Course in Mining Engineering.*—Mining. Machinery and Mot Engineering. Chemistry. Geology. Building Materials.. Drawing.] litical Economy. Natural History. French. German.

5. *Course in Building and Architecture.*—Architectural Design. Pro sional Practice. Drawing. Engineering. Desscriptive Geometry. Wa ing, Lighting, Ventilating, Acoustics. Building Materials. Political Econ Natural History. French. German.

6. *Course in Science and Literature.*—The Higher Mathematics. Ch istry. Physics. Architectural Design. Mental Science. Building Mater Drawing. Political Economy. Natural History. French. German

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COURSE IN CIVIL ENGINEERING

IN RENSSELAER POLYTECHNIC INSTITUTE.

FOUR YEARS.

DIVISION D.

WINTER SESSION.—Mathematics—Davies' Bourbon's Algebra—Chap VI–IX, inclusive; Davies' Legendre's Geometry—Books IV VI, inclus Plane Graphic Geometry—Warren's Elementary Plane Problems. Eng Language—Quackenbos' English Composition and Rhetoric, commen French Language—Fasquelle's French Grammar—Lessons I–L, inclus *Geodsey,*—Line Surveying, Elementary Practice. Geometrical Drawin *Plane Problems*—Warren's Drafting Instruments and Operations.

ER SESSION.—Mathematics—Davies' Legendre's Geometry—Books inclusive. Mensuration—Use of Mathematical Tables. Analytical metry, Plane and Spherical Trigonometry. Descriptive Geometry—s Elementary Projections. Physics—Loomis' Natural Philosophy. Language—Quackenbos' English Composition and Rhetoric, com- French Language—Fasquelle's FrenchGrammar, completed. Geod- ne Surveying, Chain Surveys. Geometrical Drawing—Elementary ons. Construction Drawing—Elements of Structures.

DIVISION C.

ER SESSION.—Mathematics—Higher Algebra. Descriptive Geometry aphic Projections. Physics—Physics of Heat. English Language— Composition; Logical and Rhetorical Criticism. French Language sh Translations, Reading of French Scientific Authors. Geodesy— rveying, Theory, Compass Surveys. Geometrical Drawing—Ortho- Projections. Topographical Drawing—Elementary Drawing, Topo- l Plans.

ER SESSION.—Mathematics—Analytical Geometry. Descriptive Geom- rthographic Projections. Chemistry—Inorganic Chemistry. Natural —Botany. English Language—English Composition; Logical and cal Criticism. French Language—English Translations; French Com- . Geodesy—Adjustment and Use of Instruments, Line Surveying, aphical Sketching, Farm Surveys. Geometrical Drawing—Ortho- Projections. Topographical Drawing—Map of Farm Surveys.

DIVISION B

ER SESSION.—Mathematics—Differential Calculus, Integral Calculus, s of Variations. Descriptive Geometry- Shades and Shadows. Physics ricity, Terrestrial Magnetism, Statical and Dynamical Electricity. ry- Practical Chemistry, Qualitative Analysis, Blow-pipe Analysis, native Minerology. Geodesy—Practical Trigonometry, Leveling, To- ical Surveying. Geometrical Drawing—Shades and Shadows, Machine g, Elements of Machines. Topographical Drawing—Maps of Topo- l Surveys.

ER SESSION.—Rational Mechanics—Mechanics of Solids, Mechanics of Descriptive Geometry—Linear Perspective. Physics—Acoustics, Astronomy—Descriptive Astronomy. Natural History—Descriptive . Geodesy—Hydrographical Surveying, Theory and Practice. rical Drawing—Perspective; Construction Drawing, Bridge Drawing. aphical Drawing—Colored Topography.

DIVISION A.

ER SESSION.- Mathematics—Method of Least Squares. Astronomy— al Astronomy, Practical Astronomy. Physical Mechanics—Mechanics ls—Friction, Strength of Materials; Mechanics of Fluids—Practical lics, Practical Pneumatics. Machines—Theory of Machines. De- e Geometry—Stone Cutting. Natural History—Physical Geography. phy—Intellectual Philosophy. Geometrical Drawing—Stone Cutting. aphical Drawing—Maps of Hydrographical Surveys.

ER SESSION.—Machines—Theory of Prime Movers, Designs for, and of Special Machines. Constructions—Stability of Structures, Con- n of Engineering and Architectural Works, Designs for, and reviews ial Works. Road Engineering—Common Roads. Railroads. Chem- Technical Chemistry. Geology—Practical Geology, Technical Geol- Philosophy—Ethical Philosophy. Topographical Drawing—Plans, , and *Sections of Railway Surveys.*

COURSE IN MECHANICAL ENGINEERING,

IN RENSSELAER POLYTECHNIC INSTITUTE.

FOUR YEARS.

DIVISION D.

THE COURSE IDENTICAL WITH THAT IN CIVIL ENGINEERING.

DIVISION C.

THE COURSE IDENTICAL WITH THAT IN CIVIL ENGINEERING.

DIVISION B.

WINTER SESSION.—Mathematics—Differential Calculus, Integral Calculus, Calculus of Variations. Descriptive Geometry—Shades and Shadows. Physics—Electricity; Terrestial Magnetism, Statical and Dynamical Electricity. Chemistry—Practical Chemistry, Qualitative Analysis, Blow-pipe Analysis, Determinative Minerology. Geodesy—Practical Trigonometry, Leveling, Topographical Surveying. Geometrical Drawing—Shades and Shadows, Machine Drawing, Elements of Machines. Topographical Drawing—Maps of Topographical Surveys.

SUMMER SESSION.—Rational Mechanics—Mechanics of Solids; Mechanics of Fluids. Machines—Cinematics. Descriptive Geometry—Linear Perspective. Physics—Acoustics, Optics. Astronomy—Descriptive Astronomy. Natural History—Descriptive Geology. Geometrical Drawing—Perspective; Machine Drawing, Elements of Machines.

DIVISION A.

WINTER SESSION.—Mathematics—Method of Least Squares. Astronomy—Spherical Astronomy. Physical Mechanics—Mechanics of Solids; Friction, Strength of Materials; Mechanics of Fluids; Practical Hydraulics, Practical Pneumatics. Machines—Construction of Machines, Location of Machines, Theory of Machines, Efficiency of Machines. Philosophy—Intellectual Philosophy. Geometrical Drawing—Machine Drawing, Complete Machines.

SUMMER SESSION.—Mechanics—Theory and Construction of Prime Movers, Designs and Estimates for, and reviews of Special Machines. Constructions Stability of Structures. Chemistry—Technical Chemistry, Chemistry of the Materials and Processes of Heating and Illumination. Philosophy—Ethical Philosophy. Geometrical Drawing—Machine Drawing, Complete Machines.

CLASSICAL COURSE OF INSTRUCTION

IN HARVARD UNIVERSITY.

FRESHMAN CLASS.

FIRST TERM.—Greek.—Xenophon's Memorabilla, Homer's Odyssey, Goodwin's Greek Moods and Tenses, Exercises in writing Greek. Latin.—Livy, (Lincoln's Selections], Cicero's Epistles, Ramsay's Elementary Manuel of *Roman Antiquities*, Zumpt's Grammar, Exercises in writing Latin. Mathe-

matics.—Pierce's Geometry, Pierce's Algebra, begun. French.—Otto's Grammar, Moliere, Racine, Modern French Comedies. Elocution. Ethics.—Champlin's First Principles of Ethics, Bulfinch's Evidences of Christianity. Integral Education.—Lectures.

SECOND TERM.—Greek. Lysias, Homer's Odyssey, Arrian's Anabasis, Greek Antiquities, Goodwin's Greek Modes and Tenses, Exercises in writing Greek. Latin.—Horace, Odes and Epodes, Cicero's Tusculan Disputations, Zumpt's Grammar, Ramsay's Elementary Manual of Roman Antiquities, Exercises in writing Latin. Mathematics.—Pierce's Algebra, finished (including Logarithms, Pierce's Plane Trigonometry. History, in French.—Histoire Grecque par Duruy. Elocution.

SOPHOMORE CLASS.

FIRST TERM.—Rhetoric.—Campbell's Philosophy of Rhetoric (Second Book), Themes. History.—Roman History. Chemistry.—Cooke's Chemical Physics. Elocution. French.—Histoire de la Litterature Francaise.

Elective Studies.—Pure Mathematics.—Pierce's Plane and Spherical Trigonometry and Navigation and Surveying, with Bowditch's Tables, Puckle's Conic Sections, Salmon's Conic Sections. Applied Mathematics.—Pierce's Plane Trigonometry and Surveying, with Bowditch's Tables, Smith's Mechanics. Greek.—The Prometheus of Aeschylus, the Birds of Aristophanes, Felton's Greek Historians. Exercises in writing Greek. Latin.—Cicero de Officiis, Quintilian, Zumpt's Grammar, Exercises in writing Latin.

SECOND TERM.—Rhetoric.—Whatley's Rhetoric, Themes, Reading in English Literature. Philosophy.—Stewart's Philosophy of the Mind. Chemistry.—Eliot and Storer's Elements of Chemistry, Lectures. German.—Krauss' German Manual, Rolker's German Reader. Elocution.

Elective Studies.—Pure Mathematics.—Puckle's Conic Sections, Salmon's Conic Sections. Applied Mathematics.—Conic Sections, Smith's Mechanics, Goodwin's Elementary Dynamics. Greek. Demosthenes, Grote's History of Greece, Vol. XI. (chapters 86–90), Lysias, Greek Composition. Latin.—Terence, Cicero, Horace, Exercises in writing Latin.

JUNIOR CLASS.

FIRST TERM.—Herschel's Outlines of Astronomy, last edition, Lectures on Mechanics.* Rhetoric.—Themes. Chemistry.—Lectures,

Elective Studies.—Mathematics.—Pierce's Algebra, chapter VIII, Pierce's Curves and Functions, Vols. I. and II. Ancient History.—Polybius, Greek Composition. Greek.—Aeschines and Demosthenes on the Crown, Greek Composition. Latin.—Pliny's Letters, Martial, Latin Exercises and Extemporalia. Chemistry.—Galloway's Qualitative Analysis, with instructions in the Laboratory. Natural History. English Language.—Thorpe's Analecta Anglo-Saxonica, Morris' Specimens of Early English, The Bible, Spencer, Shakespeare. German.—Krauss' German Manual. Spanish.—Gil Blas, Josse's Grammar and Exercises, (Sales' ed). Italian.—Dall's Ongaro's La Rosa dell' Alpi, Cuorre's Grammar and Exercises.

SECOND TERM.—Philosophy.—Forensics. Physics.—Lardner's Course of Natural Philosophy, (Optics), Lectures on Hydrostatics, Pneumatics, etc.

Elective Studies.—Mathematics.—Pierce's Curves and Functions, Vols. I. and II. Ancient History.—Plutarch, Greek Composition. Greek.—The Electra of Sophocles, Plato, Greek Composition. Latin.—Plautus, Latin Exercises and Extemporalia. Chemistry.—Galloway's Qualitative Analysis, with instruction in the Laboratory. Natural History. English Language.—Studies of the First Term continued. German.—Simonson's Deutsches Balladenbuch. Spanish.—*Don Quijote*, Sale's edition.

* *The full course of Lectures in this department appears* only by consulting the Caltaoguefor *two successive years, with reference to the same student.*

SENIOR CLASS.

First Term.—Logic and Philosophy.—Bowen's Logic, Bowen's Political Economy, Forensics. Physics.—Lectures on Optics and Acoustics. History.—Constitutional History of the United States.

Elective and Extra Studies.—Mathematics.—Pierce's Curves and Functions. Greek.—The Agamemnon of Aeschylus, the Antigone of Sophocles, Greek Composition. Latin.—Quintilian, Cicero against Verres, Latin Exercises and Extemporalia. German.—Schiller's Wilhelm Tell, Geothe's Faust, Lectures on German Grammar. Spanish.—Gil Blas, Sale's Grammar. Italian.—Dall' Ongara's La Rosa dell' Alpi, Cuorre's Grammar and Exercises. Modern Literature.—Lectures. Patristic and Modern Greek. Geology.—Lectures. Anatomy.—Lectures.

Second Term.—Philosophy.—Hamilton's Metaphysics, Bowen's Ethics and Metaphysics. History.—Modern History. Religious Instruction. Rhetoric.—Themes.

Elective and Extra Studies.—Mathematics.—Pierce's Analytic Mechanics. Greek.—Thucydides, Greek Composiiion. Latin—Lucretius, Latin Exercises and Extemporalia. German.—Goethe's Faust, Otto's German Grammar, Lessing's Emilia Galotti and Laokoon. Spanish.—Calderon's El Principe Constante, Calderon's El Magico Prodigioso. Italian.—Dante. Zoology.—Lectures. Modern Literature.—Lectures. Patristic and Modern Greek.

The Hebrew Language is taught by Professor Noyes to those who desire to learn it.

COURSES IN CIVIL ENGINEERING AND MECHANICS,

IN SHEFFIELD SCIENTIFIC SCHOOL.

JUNIOR YEAR.

A. Civil Engineering. *First Term.*—French and German—(see Select Course.) Mathematics—Descriptive Geometry (Church's), Analytical Geometry of Three Dimensions. Surveying—Higher Surveying, Topographical Surveying. Drawing—Topographical.

Second Term.—French—(See Select Course). Mathematics—Davies' Shades, Shadows, and Linear Perspective, Differential Calculus. Astronomy. Norton's Astronomy with practical problems.

Third Term.—French—(See Select Courses). Mathematics—Linear Perspective (continued), Isometrical Projection, Differential and Integral Calculus. Drawing—Isometrical and Mechanical.

B. Mechanics.—The same as the course in Civil Engineering, with the omission of Higher Surveying, Topographical Surveying, Topographical Drawing and Astronomy, and the substitution of Mechanics (Peck's Elements), Mechanical Drawing, Metallurgy, and Principals of Mechanics.

SENIOR YEAR.

A. Civil Engineering.—*First Term.*—French—Selections. Field Engineering and Surveying—Hench's Field Book for Railroad Engineers. Location of Roads, Geodetic Surveying. Mechanics—Peck's Elements, Thermodynamics. Geology—Dana, Drawing—Architectural.

Second Term.—Mechanics—Peck's Elements (continued), Application of Calculus to Mechanics, Principles of Mechanism, Theory of Steam Engine.

Civil Engineering—Strength of Materials, Bridge Construction, Stability of Arches, Stone Cutting, with graphical problems. Geology—Dana (continued).

Third Term.—Mechanics—Mechanics applied to Engineering (Weisbach, Vol. II.), Prime Movers. Civil Engineering—Stone Cutting (continued), Building Materials (lectures), Designs of Structures, Mahan's Civil Engineering. Drawing—Structural.

B. MECHANICS.—*First Term.*—Analytical Mechanics, Machinery, Thermodynamics. Drawing—Architectural.

Second Term.—Analytical Mechanics (continued), Strength of Materials, Theory and Construction of Steam Engine, Examination and Reports of Machines, Mechanical Practice.

Third Term.—Prime Movers, Mill Work, Designs of Machines.

COURSE IN AGRICULTURE.

JUNIOR YEAR.

FIRST TERM.—Agriculture—Chemistry, Structure, and Physiology of the Plant, Water Atmosphere and Soil in their relation to Vegetable Production, Improvement of the Soil, Tillage, Draining, Amendments and Fertilizers, Lectures. Experimental and Analytical Chemistry—in their Agricultural Applications, Daily Laboratory Practice. Zoology—Lectures. French—commenced. German—Woodbury's Method. Meteorology—Academical Lectures.

SECOND TERM.—Agriculture—Chemistry and Physiology of Domestic Animals, Digestion, Respiration, Assimilation and Excretion; Composition, Preparation and Value of the kinds of Fodder; Milk, Butter, Cheese, Flesh and Wool, as Agricultural products, Lectures. Experimental Chemistry—Laboratory Practice. French and German—continued. Physical Geography—Lectures. Zoology—Lectures.

THIRD TERM.—Horticultural and Kitchen Gardening—Propagation, training and culture of Fruit Trees, the Vine, Small Fruits and Vegetables, Lectures. Mineralogy—Lectures and practical Exercises. Experimental Chemistry—Laboratory Practice. French or German—continued. Drawing—Free Hand Practice. Excursions.—Botanical, Zoological, &c.

SENIOR YEAR.

FIRST TERM.—Agriculture—The staple grain, forage, root and fiber crops of the Northern States, their varieties, soils adapted for them, preparation of soil, seeding, cultivation, harvesting, and preparation for market. Lectures. Agricultural Zoology—Origin and Natural History of Domestic Animals, Insects useful and injurious to Vegetation, Lectures. Geology—Dana's Manual. French or German—Selections. Excursions—Agricultural, Zoological, Geological, &c.

SECOND TERM.—Agriculture—Raising and Care of Domestic Animals, characteristics and adaptation of Breeds, Cattle for Beef and Draught, The Dairy, Sheep for Wool and Mutton, Horses, Swine, pasturing, soiling, stall feeding, Tobacco, Hops, &c., Lectures. Forestry—Preservation, culture and uses of Forests and Forest Trees, Lectures. Human Anatomy and Physiology—Lectures Agricultural Botany—Weeds and Noxious Plants, Lectures. French or German.

THIRD TERM—Rural Economy—History of Agriculture and Sketches of Husbandry in Foreign Countries, Adaptation of Farming to soil, climate, market, and other natural and economical conditions, Systems of Husbandry, Stock, Sheep, Grain, and mixed Farming, Lectures. Farm Accounts—Lectures and practical exercises. Excursions—Agricultural, Geological, Zoological and Botanical. Examinations in the studies of the Course.

MEETING OF THE BOARD OF TRUSTEES.

ILLINOIS INDUSTRIAL UNIVERSITY,
Urbana, Champaiyn Co., Ill., Nov. 18, 1868.

The Board of Trustees of the Illinois Industrial University met pursuant to the call of the Executive Committee, in the Library Hall, at 9 o'clock, A. M.

After the reading of the Scriptures and prayer, upon calling the roll, the following members answered to their names:

Allen........................	Goltra........................
Blackburn....................	Hayes........................
Brown, of Chicago...........	Johnson......................
Brown of Pulaski............	Mahan........................
Burchard....................	McMurray.....................
Cobb........................	Pickrell.....................
Cunningham..................	Pullen.......................
Dunlap......................	Quick........................
Edwards.....................	Scroggs......................
Flagg.......................	VanOsdell....................
Galusha.....................	The Regent...................

The following named gentlemen were absent:

Bateman.....................	Lawrence.....................
Brayman.....................	McConnell....................
Burroughs...................	Topping......................
Hammond.....................	The Governor.................
Hungate.....................	

Mr. Harding being deceased.

The Regent presented the following report relating to the progress and present wants of the University:

GENTLEMEN:—Though not positively required from me by any rule of the Board, it seems fitting that I shall report to you those facts concerning the University and its several departments which will enable you to judge of its present wants, and to act intelligently upon the several matters which require your attention.

DOINGS OF EXECUTIVE COMMITTEE.

Since your meeting in March, the Executive Committee has

three meetings; the first held the 12th of May, the second
ıeld June 11th, and the third September 16th.

the meeting in May, the committee audited the accounts due. It was ordered by the committee that the students t be employed at overwork at 12½ cents an hour. The Re- was instructed to take measures to secure as favorable terms ›ssible for students' uniforms. The Regent and head farmer authorized to employ a gardener, and $400 were appro- ed for repairing farm buildings and fences. A portion of the having been received from Mr. Dunlap's nursery, a commit- vas appointed to confer with the supplier concerning the s for the same.

; the meeting of June, the accounts were audited to that The issue of a circular and catalogue was ordered, and opriations were made for drums and fifes. A committee was inted to inquire into the quality and cost of tile wanted for iing farm and garden. It was ordered that application should ade to the Trustees to sell 50,000 acres of scrip at not less $1 10 per acre.

ıese orders were subsequently carried out, but no sale of scrip ret been made under the authority thus obtained. The com- ;e also ordered that Assistant Professors shall be paid a salary 1200 per annum.

; the meeting in September all accounts were audited to that and appropriations were voted as follows:

›r Chemicals	$368 69
Chemical apparatus	439 45
a Microscope, not exceeding	250 00
Forcing pit	250 00
Drainage	1200 00
Surveying instrument	400 00

.dge Cunningham and Mr. Periam were appointed a commit- o rent the Griggs farm for the next year. A meeting of the tees was ordered to be called for the 18th of November. ·ations were authorized to be made to provide a dining room e basement, and to fit up the old dining room for the library reading room, with portable furnace to warm the class rooms chapel above it. The purchase of additional chairs, and of wheat, was also ordered. The Professor of Chemistry was ucted to *keep an account of* chemicals used by each student,

and that the question of price to be charged for these chemicals, be left to be decided by the full Board.

The orders have been carried out, except that relating to drainage. A correspondence was opened with the several manufacturers of drain tile, to ascertain the costs of the several kinds of tile, and Prof. Shattuck proceeded to make a topographical survey of the farm and garden, preparatory to the adoption of some suitable system of drainage. We shall be ready to begin the work whenever the weather will permit.

The bills for the several purchases made under the orders of the Executive Committee will be presented to the Board for approval.

Under the authority granted, Mr. Thomas Franks, a thoroughly instructed and competent English gardener was employed, and is now at work, at a salary of $50 a month.

It may be stated here, that considerable donations of bedding plants and shrubs have been received from several prominent Horticulturists in the State. Other donations of valuable tools and implements for the farm and garden have been received from gentlemen engaged in the manufacture of agricultural implements, and donations of text and library books have been made by several eminent publishing houses.

The following is a list of donations received to this date:

L. Vandesyde, Calumet, 1 set reed mats.

Emerson & Co., Rockford, 1 Jones' hand corn planter.

Fuller & Palmer, Chicago, 50 sash for garden use.

R. S. Wheatley, Du Quoin, 1 subsoil and garden plow.

Barlow, Wood & Co., Quincy, 1 Vandever's corn planter with drill attachment.

Furst & Bradley, Chicago, 1 walking cultivator.

Clark & Utter, Rockford, 1 Gorham seeder and cultivator, combined.

Wm. Lintner, Decatur, 1 farm pump.

J. J. Inglehart, Matteson, 1 Granger patent rotating harrow.

Hubbard & Finch, Champaign, 1 two horse cultivator, Frazier's patent, and 1 Kalamazoo three horse clevis.

Robert Douglas, Waukegan, collection evergreen seeds.

S. Wilbur, Momence, duplicate collection of flower seeds.

D. M. Ferry & Co., Detroit, Mich., collection of flower and garden seeds, and 1 package of Behera wheat, imported from Egypt.

T. W. Lachore, Blue Island, 2 wheel hoes.

B. Dornblazer, Joliet, 1 Hoosier riding or walking cultivator, and 1 double shovel plow.

J. C. Wilson, Crete, 1 patent rotary harrow.

Phœnix, Bloomington, 100 rose bushes, and collection of flowering shrubs and bedding plants.

Edgar Sanders, Chicago, 100 select bedding plants.

P. S. Meserole, Chicago, 1 Allen's Weeder, 1 Hexamer pronged hoe.

Joseph Mainhofer, Ottawa, 1 Messenger or Gopher cultivator, with extra shares.

John Deere, Moline, 1 improved P. P. plow.

O. M. Railsback, Champaign, 300 select green house and bedding plants.

Jacob Strayer & Co., South Bend, Ind., 1 Statesman force feeding grain drill, grass sower and surveyor.

Fairbanks, Greenleaf & Co., 1 set of grocer scales, 1 set counter scales, discount on hay scales, $75.

H. C. Rector, Champaign, 1 Blevin's patent plow and cultivator.

M. A. & J. M. Cravath, Bloomington, 1 revolving cultivator and hilling machine.

M. Dorsett, Chicago, 1 model straw rick, with ventilating tube for preserving hay or grain, and movable roof.

M. Cochrane, Architect, 1 fine colored lithograph of new State Capitol.

Valuable text and library books received from Sheldon & Co., New York, R. S. Barnes, New York, D. Appleton, New York, Harper Bros., New York, Ivison & Phinney, New York.

S. M. Hayward & Son, Pana, Ill., red Genesee winter wheat, for seed.

A. Blumenshein, Florist, Chicago, collection of green house plants.

Edgar Sanders, Chicago, collection of bulbs,

Edgar H. Potter, Kalamazoo, Mich., improved three horse clevis.

DOINGS OF OTHER COMMITTEES.

The committee on Building and Grounds met in conjunction with the Executive committee, both in April and June. They recommended several alterations and improvements in the University buildings, which, having been considered and ordered by the Executive committee, were afterwards carried into effect. They also recommended the erection of a building to be used partly as a carpenter's shop, and partly to shelter tools and one team. This building, under an order of the Executive committee, has been erected, and is now in use.

The committee on Faculty and Studies has also held several meetings. The time when Prof. Powell should enter upon service having been referred by the Board to this committee, an interview was held with Prof. Powell, and on his full acceptance of the appointment tendered him by the Board, he was put on service at once, but at his own request was detailed to conduct the scientific expedition he was already engaged in. The sum of six hundred (600) dollars was voted to him as a salary in full for

the time he should be absent, it being agreed that this sum should also be in lieu of the appropriation he had asked from this Board in behalf of the University, to the several collections proffered by Prof. Powell as an inducement for such appropriations. Subsequently Congress passed a law granting some material aid to this expedition, and giving it much larger power to secure valuable collections. Prof. Powell's absence has delayed a reception of the collections made by him in his former expedition.

Prof. Sewall having declined the appointment tendered him to the chair of Chemistry, the committee, under the authority given by the Board, secured the services of Prof. A. P. S. Stuart, late of the Lawrence Scientific School, in Harvard University, and now recommend Prof Stuart to the Board for permanent appointment to the chair of Chemistry.

The committee also secured the services of Col. S. W. Shattuck, late of Norwich University, as Assistant Professor of Mathematics, and of Prof. Thos. J. Burrill, late Principal of the Urbana High School, as Assistant Professor of Natural History and Botany, and now ask the appointment of these gentlemen to these places for the current year. In accordance with a resolution of the Board, the committee has employed Capt. E. Snyder as Accountant and teacher of Book-keeping, and his appointment for the current year is cordially recommended. The salary of Profs. Shattuck and Burrill was fixed at $1,200 per annum, and that of Capt. Snyder at $1,000. I would respectfully suggest that, as Capt. Snyder has been called upon to give instruction in German, is doing full service as a teacher, that the title and salary of an assistant professor be accorded to him. The appointments tendered by you to Dr. Warden and Mr. Eggleston have been accepted by these gentlemen, and Dr. Warder will give his first course of lectures in January next. The time for the lectures of Mr. Eggleston has not yet been fixed.

Prof. Atherton having accepted a Professorship in an Eastern college has given notice of his resignation, to take effect the 1st of January next. As chairman of the Library committee, and under advice from the committee, I have recently expended $600 of the library fund, set apart by you from the matriculation fees, for such books as seemed most needful, including a large number of agricultural works. There is a small unexpended balance of this fund, which will enable us to provide the reading room with a necessary supply of periodicals. It is of vital importance to the

haracter and success of the University that large appropriations e made, at the earliest practicable moment, to supply the library with needful books. Neither teachers nor students can do the est work without a ready access to the full fountains of the best earning in all the departments of study. No feature of an instiution of learning is more attractive to either the highest grade of nstructors or students than an ample and well selected library. The following is the list of Books lately purchased by the Library ommittee:

AGRICULTURAL.

uller's Grape Culturist........................
uller's Strawberry Culturist ....
ennon's Milch Cows............................
erbert's Hints to Horsekeepers ....
op Culture ....
gricultural Chemistry .... Johnson.
lements of Agricultural Chemistry... Johnson.
ow to Build Hothouses, ... Luchar.
y Vineyard at Lakeview........................
nion Culture....................................
eat and its Uses, ... Johnson.
edders Land Measurer..........................
andall's Sheep Husbandry.......................
andall's Fine Wool Sheep Husbandry.........
ichardson on the Dog..........................
iniature Fruit Garden................... Rivers.
omestic Poultry .... Sanders.
chenck's Gardeners' Text Book...............
ood of Animals.................... Thompson.
obacco Culture..................................
n the Horse............... Youatt & Spooner.
n Cattle.................... Youatt & Martin.
n the Hog. .... Youatt.
lax Culture.....................................
harlton's Grape Culture.....................
im Bunker's Papers.............................
ow Crops Grow .... Johnson.
he Percheron Horse .... Huys.
ariations of Animals and Plants, 2 vols. Darwin
ook of Evergreens....................... Hoopes.
otton Culture .... Lyman.
rainage for Profit and Health..............
quashes.............................. Gregory.
he Grape Vine............................ Mohr.
merican Pomology...................... Warder.
mall Fruit Culture......................... Fuller.
ardening for Profit.................. Henderson.
ysteries of Beekeeping................... Quinby.
ural Architecture................. L. F. Allan.
merican Farm Book................ R. L. Allen.
iseases of Domestic Animals...... "
merican Agricultural Annual...................
" Horticultural " ....
" Bird Fancier.............................
" Rose Culturist............................
" *Weeds and useful Plants*..................
Rabbit Fancier........................ Bement.
Method of making Manure........... Bommer.
New Book of Flowers.................. Breck.
Country Life .... R. M. Copeland.
Horse Doctor......................... Dadds.
Cattle " .... "
Muck Manual............................ Dana.
Dog and Gun .... Hooper.
The Cranberry....................... Eastwood.
Western Fruit Growing................ Elliott.
Farm Drainage.......................... French.
Country Life .... Cooper.
Cotton Cultivation.......................... Ure.
Horticulture .... Lindley.
Fields, Garden and Woodlands.......... A Lady.
Poultry a Meat Supply...........................
Horse Portraiture...................... Simpson.
Farmer's Library ....
The Horse, and How to Feed Him .. Armatage.
Grape Culture............................. Mead.
Fruit, Flowers and Farming............ Beecher.
Our Neighborhood ....
Home Pets .... Beaton.
Age of Horses .... L. Brandt.
Horsehoeing Husbandry.......... Jethro Thull.
Domestic Animals.................... Prof. Low.
The Complete Grazier...........................
The Mule .... Riley.
The American Shepherd................ Morrell.
The Beauties of Tobacco............... De Coin.
Elementary Agriculture................. Norton.
Agricultural Chemistry............... Chaplins.
Farmers' Companion........................ Buell.
Agriculture for Schools.................... Blake.
Liebig's Modern Agriculture...................
The Complete Farmer .... Fessenden.
Farmers' Barn Book....................... Clater.
Prairie Farming .... Card.
Cyclopedia .... Doyle.
Planter's Encyclopedia...........................
Choice of Farm.....................................
How to get a Farm...............................
Floral Biography .... Charlotte Elizabeth.
Landscape Gardening .... Downing.
Field and Garden Vegetables of America.. Burr.
Horticulture Register, 5 vols.......................

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Home Gardens ....

American Gardener .... Cobbett.

Flower Garden .... Brecks.

Rose History .... Parsons.

Florist Guide .... Louisa Johnson.

Adam, the Gardener .... Clarke.

Parlor Garden .... Cornelia Randolph.

Ladies Companion for Flower Garden ....

River Garden .... Humphrey.

Landscape Garden .... Kemps.

American Gardener .... McMahon.

Studies from Nature ....

Grape Culture .... Allan.

Open Air Grape Culture .... Phin.

The Grape Question .... Sanders.

On the Grape .... Strong.

Graperies .... Woodward.

Pear Culture .... Fields.

Fruit Culturist .... J. J. Thomas.

Strawberry Culture .... Pardy.

Fruit Trees .... Downing.

Practical Fruit Culture .... Baker.

The Cotton Plant .... Turner.

Sorghum and its Products .... Stewart.

Modern Husbandry .... Andrews.

Farm and Fireside .... Blake.

Country Rambles .... Cooper.

Beetro t Sugar .... Brant.

Agricultural Chemistry .... Chaptal.

" " .... Liebig.

Analysis of Soils .... "

Indian Corn .... Enfield.

Landed Property .... David Low.

The American Cottage Builder .... Bullock.

Cottage Residences .... Downing.

HISTORY.

Palfrey's New England, 3 vols ....

Ellet's Domestic History of the Revolution .....

Illinois .... Ford.

Illinois in 1837 ....

Illinois as it is ....

Ritchie's Wisconsin ....

Washington's Correspondence, 12 vols ....

Sparks' American Correspondence. ....

Sparks' Letters to Washington, 3 vols ....

Hildreth's U. S. History, 5 vols ....

Sims' South Carolina ....

Ramsey's South Carolina ....

Burnett's Northwest ....

Historical Collections of Ohio ....

Settlement of Delaware ....

Historical Collections of Louisiana, 5 vols .....

Buchanan's Administration ....

History of New Jersey ....

Connecticut Historical Collections ....

States and Territories ....

Mather's Magnolia ....

Niel's Minnesota ....

Mississippi Bubbles ....

Hazard's Annals of Pennsylvania ....

Gordon's Pennsylvania ....

Howison's Virginia ....

Burke's Virginia, 2 vols ....

The Annals of Tennessee ....

Wheeler's North Carolina ....

Conquest of Florida ....

The Color Guard .... Hosmer.

Butler in New Orleans .... Parton.

American Antiquities ....

Lossing's United States ....

History of America, 2 vols ....

Botta's War of Independence, 3 vols ....

Whatson's Men and Times of the Revolution ...

Power and Progress of the United States ....

Americus Vespucius ....

History of Pontiac's Conspiracy ....

Barber's New England ....

Manual of Modern History ....

Martin's China, 2 vols ....

Rembault's France ....

Florence of Worchester Chronicles ....

The Loyalist of the Revolution, 2 vols ....

Adolphus' England, 7 vols ....

Cradle of the Rebellion ....

Report of Kossuth's Reception ....

BIOGRAPHY.

Irving's Life of Washington, 5 vols ....

" " Columbus, 3 vols ....

" " Mahomet, 2 vols ....

Sparks' " Washington ....

Life of J. Q. Adams ....

Diary of A. Lawrence ....

Parton's Life of A. Burr ....

Sargent's Major Andre ....

Irving's Goldsmith ....

Flander's Lives of the Chief Justices, 2 vols ..

Life and Writings of J. Adams, 10 vols ....

Alebone's Dictionary of Authors ....

Dictionary of Congress ....

LITERATURE, &c.

Chamber's English Literature, 2 vols ....

Duyckink's American " 2 vols ....

Sismondis Literature ....

Chaucer's Poems ....

Irving's Spanish Papers, 2 vols ....

" *Crayon* Miscellany ....

Irving's Bracebridge Hall ....

" Knickerbocker of N. Y. ....

" Woolfort's Roost ....

" Miscellanies ....

" Lake Traveller ....

" Bonneville ....

Irving's Astoria	Politics and Law. ....
Farnham's Prairie	Webster's Works, 6 vols ....
Hall's New Purchase......................	Curtis on the Constitution, 2 vols...............
Bartlett's Americanisms	Madison's Writings, 4 vols ....
Language and Study...........................	Miller's View of the English Constitution.......
Science of Literature...........................	

SCIENCE AND ARTS.

Gray's Botany	Mudy's British Birds............................
Marcett's Vegetable Physiology................	Balane's Philosophy, 2 vols ....

The superintendent of the farm furnishes the following report of the operations on the farms during the present season:

Upon looking over the farm belonging to the Industrial University, last spring, I found the fences in bad condition, being broken down, and in some instances carried away—stock of all kinds running at will over the fields.

I foresaw that it would be impossible to expect anything like success this season, with the means available for the purpose. In consequence, my first endeavor was to make the fences secure, so far as lay in my power, not by attempting too much new fencing but by removing division fences to make the enclosures next the roads as far stock proof as possible. This was the more necessary since there was so much stock running at large, ranging from sucking pigs to droves of cattle and horses, some of them, I am sorry to say, owned by persons who ought to have felt above allowing their stock to pasture in the road. I find also, from past experience, that it will be necessary to make absolute fences that cannot be torn down nor broken into, since everything that we have exposed is liable to the depredations of unscrupulous persons.

The vegetables planted upon the 40 acres south of the University have, from the weedy nature of the land and the fact that this portion, as well as the other parts of the University grounds, were entirely open to the depredations and tramping of droves of stock; while wet, together with the succeeding drougth of the summer, rendered it so hard that the crops planted were almost an entire failure. One quarter acre of Carrots produced 40 bushels. Parsnips, onions, swedes, salsify, and other roots were an entire failure, so that the land was ploughed up.

This was upon the second planting, late in May, the first planting having been drowned and washed out by the continued and excessive rains of early May.

Of potatoes there were planted about three acres, which were faithfully plowed, and also hoed by hand twice; nevertheless the

yield was but 95 bushels. Of the sort planted were, Early York, Sebeg, Goodrich, White Sprout and Peach Blow. The first named gave the best yield, and the last named were the poorest, yielding but eight bushels for 1½ acres of land, while the first four named varieties, 1½ acres, yielded 87 bushels. The reason for this was, that being early varieties they attained a larger size before the drought stopped their growth, none of the kinds having improved in size since about the 1st of July. The tops, however, receiving light showers, did not succumb until about the 1st of August.

The Wilson Strawberry plants which were set out contiguous to these crops have done remarkably well, considering the land and season, but have not made many runners, although I think we may get from 10,000 to 12,000 plants for next spring without detriment to the crops. The Rhubarb was nearly killed by the season and hard baked land, and will have to be removed to better soil. The Sugar Corn gave a fair yield, but was badly depredated upon by poachers. It was planted too late to be available for market, and is stored away for seed. The Tomatoes planted made as good a growth as could be expected, but like the corn, they were stolen until they became quite plenty; the balance were sold, bringing $16 35.

The land was plowed last spring six inches deep, and has this fall been trenchplowed (with the exception of the land in corn), 12 to 14 inches, in the most thorough manner. The land previously in sweet corn has been re-plowed 8 to 10 inches deep.

Of the land rented, there was produced for the University share, by G. H. Holmes, 50 acres, 40 bushels oats, 30 bushels wheat; Witt, Riel and Kraft, 80 acres, 162 bushels corn, 9½ bushels buckwheat, 127 bushels oats; Martin Clancey, 48 acres, 386 bushels corn, 67 bushels oats; M. Schultz, 20 acres, 332 bushels corn; C. Campbell, 80 acres, 123 bushels oats, 16¾ bushels wheat, 511 bushels corn; sundry parties, 15 acres, 53 bushels oats. Total, 293 acres. Corn not all delivered.

Of this land about 50 acres are situated upon the experimental farm, and the balance, 240 acres, is upon the stock farm, and includes slough and unproductive land about 40 acres, making land actually cropped about 200 acres. Of this rented land, all that was in small grain has been re-plowed this fall—all of it 10 inches deep, as near as it could be worked; and there has been

sown and drilled (7 to 15 inches apart), the following kinds of winter wheat:—2 bushels white May wheat, donated by Prof. W. F. Bliss; 2 bushels Red Genesee wheat, donated by Messrs. Haywood & Son, of Pana, Ills.; 1 peck of Polish wheat, from Department of Agriculture; ½ bushel Talavera wheat, donated by Prairie Farmer Co., Chicago; ½ bushel Behira Egyptian Wheat, received last spring from D. M. Ferry & Co., of Detroit, Mich.

The experiment intended to be carried out in this direction is to find the relative value between sowing broadcast, drilling 7 inches and drilling 15 inches apart. The 15 inch drills are to be hoed, the sowing all being done by machine, the land all plowed alike, 10 inches deep; and I propose, as some of the varieties are thought to be tender, to cover it with mulch, if possible, this winter. I would like also, if thought advisable, to continue the same experiment with the leading varieties of spring wheat.

I have received a proposal of W. M. Mann & Co., of Gillman, that they donate us Hedge plants for one mile, and sell us what we want besides for $2 10 per mile. I have not done anything yet in preparing the Hedge rows, not knowing where the lines might be, apprehending that the committee, perhaps at this meeting, would make some modifications.

I prepared and set, last spring, 80 rods of hedge between University lands and M. Burt, in connection with himself, and the result has convinced me that it is not profitable to continue this kind of experiment, but to make our fences for ourselves alone. The opinion of the Professor of Agriculture is, that the land next year should be entirely worked by ourselves, in which I fully coincide, in consequence of the difficulty of getting the work done by tenants as well as it ought to be done. I must, however, do our tenants the justice to say that they have carried out their agreements the past season faithfully, and as well as they were able, with one exception, and acknowledge that they have worked their crops better than I have been able to do with the help at my disposal—butwith the deep plowing this fall we ought to expect to do much better next and each ensuing season. It is not to be denied that the lands belonging to the University have been badly worked heretofore, and it is simply impossible to clean them by horse power alone among crops in one season, but with proper draining, clean culture, clover and fallow crops, it will not be difficult to renovate and *bring up to a high* standard, such a soil as we pos-

sess. The only question to be decided is, whether it is to be done by expending a good deal of money during one or two years, or gradually by a system of rotation and turning under of green crops. My suggestion would be to keep clean at any cost, what we cultivate, use all the manure we can make or buy, sow clover liberally and turn it under from time to time.

There is now on the stock farm about 150 acres of worn-out meadow. Last spring I sowed 80 acres of Timothy seed, which came up well, but subsequently succumbed to the extreme drought, as did, indeed, all other sowings made in this neighborhood so far as has come to my knowledge.

The reason for sowing clean Timothy was from the fact, that having no stock on the place, that is to be sold, it would bring more money than if mixed with clover. The failure of the crop will oblige us to hold our old meadow another year, and what seed is to be sown next year, I think, should be largely of clover, in order to make it assist in improving the condition of the land. The advantage of sowing largely of clover, would be the pasturage obtained and the consequent manuring of the land from the droppings of the stock pastured. The second year a crop of hay might be taken, and if the land was sufficiently rich, a crop of seed after it.

The aftermath might be plowed under and wheat sown, to be followed with corn; that with small grain and reseeded; or, a crop of corn might be raised upon the sod, trenched, say 10 inches deep, to be followed with wheat or barly and reseeded, until the land was brought into a high state of fertility. A good rotation, when stock enough was kept to eat all the corn and hay, would be to divide the farm into fields for a four years' rotation, keeping one quarter of the farm in corn, one quarter in small grain, one quarter in pasture and one quarter in meadow. A six years' course would give corn, oats, corn, barley or wheat, pasture, meadow. A seven years' course might include a fallow, if necessary, but naked fallow I consider objectionable. This might be obviated by sowing and plowing under green crops, as corn, rye, buckwheat or millet. I consider oats an objectionable crop upon any land strong enough for wheat. My experience is that oats require very good soil to produce a paying crop, but it will grow on land too moist for wheat or barley. Root crops are entirely left out; if used, they must be upon a part of the land devoted to corn.

Upon moving to this place I brought with me a fine young team ' horses, which I have worked upon the farm ever since. Last ›ring I took two plats of land containing about four acres, partly r experiment, partly to raise my own vegetables, and partly be- ıuse the land in the College garden plat was in so bad a condition ıat I knew that nothing could be raised to advantage there. Upon ıis plat I planted Early York, Sebeg, Chenery, Goodrich, White prout, Jackson White, Titicaca and Peach Blow potatoes. The ;arly York and Titicaca potatoes yielded the best crop; Chenery, toodrich and White Sprout were about alike for earliness; the 'each Blow, being late, suffered from the depredations of the lack potato bug, (Cantharis Astrata, supposed). All the other ›otatoes suffered also more or less, early in the season, from at- acks by the 10 lined potato beetle, but were principally held in :heck, and finally destroyed by cannibal insects, especially the ady bugs and so-called stink bugs. Among the vegetables planted were, Boston Marrow, Hubbard, Turban and Mammoth French Squash, five sorts String Beans, four sorts Parsnips, four sorts Peas, three of Carrots, two of Spinach, one of Salsify, five sorts of Melon, three sorts Sweet Corn, seven sorts of Onions, six sorts of Cabbage, five sorts Tomatoes, six sorts of Beet, and Okra, Celery, Radish, Lettuce, Egg Plant, Martynia, Pepper, Kohl Rabi, Nasturtium, and some other plants. These were kept absolutely clean, and the result was satisfactory, even for this dry season, many of the sorts, as Celery, Egg Plant and Okra being extremely good for any season or climate.

Sixty-one of the varieties were shown at the Champaign County Fair, receiving, as a whole, a complimentary premium, besides notices upon specialities. They were not placed there for competition, as it was not considered advisable to compete with private collections.

I have thought that under the circumstances, it would not be asking too much of the Trustees to allow the use of my team to offset the land used.

Wheat blossomed June 13th; potatoes, beets, carrots, turnips and early peas were fit for the table the same day. On the 20th, Champion of England peas were picked; on the 23d, string beans and cucumbers; 25th, Eureka tomatoes; 26th, Keyes' early tomatoes; July 9th, Tilden tomatoes; 11th, sweet corn; 12th, egg plant; *22d, wheat ripe; 25th*, oats ripe; September 11th,

Burlington corn, planted June 13th, was fully matured for cutting up.

JONATHAN PERIAM, *Head Farmer.*

APPROPRIATIONS.

The chief question which should engage the attention of the Board at the present meeting, is the propriety of asking an appriation from the State Legislature at its coming session. It has become more and more obvious that the best interests, if not the first success of the University, will demand prompt and sufficient State aid, and it is hoped both that the great interest of the present and coming generations here involved, and the almost uniform example of sister States, will incline the Legislature to extend to this institution the aid it needs. It is certain that the agricultural operations planned here, and expected by the Legislature and the people to be carried out, cannot be sustained by the funds of the University without seriously crippling its proper work of instruction. But the failure to carry out the agricultural experiments, or even any considerable delay in effecting a full organization of the experimental farms and gardens, would create public distrust and rob the University of that public confidence essential to its success. The amount of these appropriations required will be laid before you at some suitable hour, to be appointed by you, for their discussion.

J. M. GREGORY, *Regent.*

On motion of Mr. Cunningham, the reading of the minutes of the last meeting of the Board of Trustees was dispensed with, those minutes being already in print.

The minutes of the Executive Committee were read for information, and the committee instructed to correct the minutes by inserting the following items omitted by mistake, viz : the order for a carpenter shop and tool house, and the order for the purchase of surveying instruments.

The usual oath as trustee was administered to M. Brown, of Chicago.

The Regent, as chairman of the committee on Faculty, reported that the committee had employed A. P. S. Stuart as Professor of

Chemistry. Thos. J. Burrill as Assistant Professor of Natural History and Botany, Col. S. W. Shattuck as Assistant Professor of Mathematics and Instructor in Military Tactics, and Capt. E. Snyder as Bookkeeper and Instructor in Bookkeeping, and now recommend these gentlemen for permanent appointment to these several places. The Regent further stated, that Capt. Snyder had been employed during the term in teaching German, and recommended that he be appointed to an Assistant Professorship, to be hereafter named.

The Board, on motion, proceeded to consider the nominations made by the committee on Faculty and Course of Study, and on motion of I. S. Mahan, it was voted—"That Professor A. P. S. Stuart be and is hereby elected to the chair of Chemistry, at a salary of two thousand (2000) dollars per annum, to take effect from and after September 1, 1858; that Thomas J. Burrill be elected Assistant Professor of Natural History, at a salary of twelve hundred (1200) dollars per annum, for the term of one year from the 1st day of September, A. D. 1868.

Resolved, That Col. S. W. Shattuck be elected Assistant Professor of Mathematics and Instructor in Military Tactics, at a salary of twelve hundred (1200) dollars per annum, for one year from September 1st, A. D. 1868.

The Regent asked that Captain Snyder be appointed Assistant Professor without assigning his place, at a salary of twelve hundred (1200) dollars per annum. Whereupon on motion of Mr. Cunningham, he was so appointed, his appointment to take place from and after this date.

Mr. Hayes, of Chicago, asked leave to read a communication from the Common Council of Chicago, in relation to the Polytechnic School in Chicago; which being granted, he proceeded to read as follows:

STATE OF ILLINOIS,
COOK COUNTY,
CITY OF CHICAGO.

I, A. H. Bodman, Clerk of the City of Chicago, do hereby certify that the following proceedings were had in the Common Council of said city, at a regular meeting held August 3d, 1868, to-wit:

Ald. Holden, of Committee on Finance, to whom had been referred several petitions in relation to the location of the Mechanical department of the Illinois Industrial University, and asking that the Common Council appropriate a certain amount of money therefor, submitted a report recommending the adoption of a preamble and resolution attached thereto.

Ald Macalister moved that the report and resolution be laid over and published.

Carried.

The report and resolution are as follows:

To the Hon. the Mayor and Aldermen of the City of Chicago, in Common Council assembled:

Your Committee on Finance, to whom was reforred a communication, with preamble and resolution, from Hon. S. S. Hayes, Trustee Mechanical Department State Industrial University, as also communication from S. S. Hayes, J. C. Burroughs, J. M. Van Osdell, E. L. Brown, and D. S. Hammond, Committee of the Trustees of the Mechanical Department of the Illinois Industrial University; also seventeen petitions from citizens of Chicago—all of which ask this Council to favorably consider their application to have the Polytechnic College or Mechanical department of the State Industrial University, located in the city of Chicago, with an appropriation of $250,000, by a contribution to the same, having carefully considered the subject, report that your Committee fully indorse the views as set forth in the preamble and resolution referred to them.

Your Committee believe that the interests of the mechanics of the Northwest, of which Chicago is the commercial center, demand an institution of this kind for the better development of the arts and sciences in our midst, and believing this, we think it the duty of this Council, as the legislative body of the City of Chicago, to lend its aid in the manner sought, and we would respectfully ask the concurrence of this Council in the following preamble, and the passage of the resolution herewith.

WHEREAS, The establishment and successful operation in the city of Chicago of a Mechanical or Polytechnic College, for the more thorough education of mechanics in those sciences which are necessary for the attainment of the highest skill in the mechanical arts, would be of great value to the industrial class in the city of Chicago, and to the State at large, and

WHEREAS, Under the acts of Congress, and the General Assembly of the State, the Board of Trustees of the State Industrial University have designated Chicago as the place for the location of the Mechanical or Polytechnic department of that University, subject to the condition that the same be located as near the center of the city as possible; and

WHEREAS, The county of Champaign has donated to the Agricultural department of said University, county bonds of said county to the amount of $100,000, and other property to the estimated value of $350,000 more, in consideration of the location of said Agricultural Department in said county; and

WHEREAS, There seems to be a defect of power under the city charter for the city to issue bonds for such a purpose at this time, therefore, be it

Resolved, by the Mayor and Aldermen of the City of Chicago, in Common Council assembled, That the following proposition be and the same is hereby made to the Board of Trustees of the Mechanical or Polytechnic department of the State Industrial University, to-wit: If and upon condition that the Trustees of said Mechanical department shall permanently locate said de-

partment and its buildings at a site within one-half mile of the geographical centre of the city of Chicago, the Common Council will, and hereby pledges itself, to make application to the General Assembly of the State, at its next regular session, for power to issue seven per cent. bonds of the said city to the amount of $250,000, as an endowment for said Mechanical department, and, upon obtaining such power, will, within ninety days thereafter, issue and deliver to the Trustees of said Mechanical or Polytechnic department for the purpose aforesaid, the said amount of $250,000 of seven per cent. bonds of the city of Chicago.

All of which is respectfully submitted.

CHARLES C. P. HOLDEN,
CHARLES G. WICKER,
THEODORE SCHINTZ,
Committee on Finance.

I do further certify that at the regular meeting of said Common Council, held in Chicago August 10th, A. D. 1868, the following proceedings were had, to-wit:

Report of Committee on Finance on petitions and resolutions in relation to Illinois Industrial University, laid over and published Aug. 3, 1868.

Ald. Holden moved to concur in the report and pass the resolution.

Ald. S. I. Russell moved to postpone action until next regular meeting, and demanded the ayes and noes thereon.

The motion was lost by the following vote:

Ayes—Knickerbocker, Calkins, Macalister, S. I. Russell, B. F. Russell, Casselman, Buehler, Beebe, Schmidt, Berger, Herting—11.

Noes—Cox, Donnellan, Wicker, Hahn, McRoy, Raber, Sheridan, Walsh, Keeley, Hildreth, Comiskey, Rafferty, Carpenter, Salisbury, Holden—15.

The question then being on the motion of Ald. Holden, the ayes and noes were called, and the report was concurred in, and the resolution adopted by the following vote:

Ayes—Knickerbocker, Cox, Dixon, Donnellan, Wicker, Hahn, McRoy, Calkins, Raber, Sheridan, Walsh, Keeley, Macalister, Hildreth, Comiskey, Rafferty, Carpenter, Salisbury, Holden, Buehler, Beebe, Schmidt, Berger, Herting—24.

Noes—S. I. Russell, B. F. Russell, Casselman—3.

The following is the resolution as passed:

WHEREAS. The establishment and successful operation in the city of Chicago, of a Mechanical or Polytechnic College for the more thorough education of mechanics in those sciences which are necessary for the attainment of the highest skill in the mechanical arts, would be of great value to the industrial classes, to the city of Chicago, and to the State at large, and

WHEREAS, Under the acts of Congress, and the General Assembly of this State, the Board of Trustees of the State Industrial University have designated Chicago as the place for the location of the Mechanical or Polytechnic department of that University, subject to the condition that the same be located as near the center of the city as possible; and

WHEREAS, *The county of Champaign* has donated to the Agricultu

department of said University, county bonds of said county to the amount of $100,000, and other property to the estimated value of $350,000 more, in consideration of the location of said Agricultural department in said county, and

WHEREAS, There seems to be a defect of power under the city charter for the city to issue bonds for such a purpose at this time, therefore, be it

Resolved, By the Mayor and Aldermen of the city of Chicago in Common Council assembled, that the following proposition be, and the same is hereby made to the Board of Trustees of the Mechanical or Polytechnic department of the State Industrial University, to-wit: If, and upon condition that the Trustees of said Mechanical department shall permanently locate said department and its buildings at a site within one-half mile of the geographical centre of the city of Chicago, the Common Council will, and hereby pledges itself, to make application to the General Assembly of this State, at its next regular session, for power to issue seven per cent. bonds of the said city, to the amount of $250,000, as an endowment for said Mechanical department, and, upon obtaining such power, will, within ninety days thereafter, issue and deliver to the Trustees of said Mechanical or Polytechnic department for the purpose aforesaid, the said amount of $250,000 of seven per cent. bonds of the city of Chicago.

And that said resolution was duly approved by the Mayor of said city, and remains in full force.

[SEAL.] In testimony whereof, I have hereunto set my hand and the seal of said city, this 17th day of November, A. D. 1868.

A. H. BODMAN, *Clerk.*

Mr. Flagg asked and obtained leave to read a resolution relating to experiments to be carried out upon the University farm, and simultaneously in different parts of the State, and that the Regent be authorized to draw a warrant to meet the expenses of the same, unless the Legislature shall make up appropriations for the same; and also a resolution, that the Executive committee provide for a course of lectures and discussions, to commence about the 12th of January next, to continue two weeks; that the co-operation of the practical farmers of the State be earnestly solicited to make the discussion successful, and disseminating the views in practical and scientific agriculture and in facts relating thereto.

Laid on the table.

On motion, a recess was taken until 12 o'clock, to enable the committee on Polytechnic branch to report. Upon re-assembling at 12 o'clock, the committee on Polytechnic School reported as follows:

REPORT OF COMMITTEE.

Your special committee to whom was referred the resolution of the city of Chicago, proposing the donation of $250,000 to the Mechanical department of this institution, located at Chicago, and the resolution of Mr. Hayes in relation thereto, would report that we recommend the adoption of the resolution in the following form:

Resolved, That this Board appreciate highly the liberal proposition of the city of Chicago, by its resolution of August 11th, 1868, to appropriate $250,000 of seven per cent. bonds of said city, as soon as the requisite power can be obtained, as an endowment for the Mechanical Department of this University, upon condition that the said department and its buildings should be permanently located at a site within one-half mile of the geographical center of said city.

Resolved, That in accordance with the resolution of this Board of March 13th, 1867, establishing a Mechanical Department of the Industrial University at Chicago, as near as possible to the center of the city, the members of this Board residing in the Third Grand Division and First Congressional District be, and they are hereby, instructed to accept said proposition, and notify the said city thereof; and they are authorized and instructed to execute and deliver such contracts as may be necessary or proper in the premises.

(Signed) I. S. MAHAN,
Chairman of Committee.

Mr. Hayes moved its adoption, which being seconded, the ayes and noes were called, resulting as follows:

Ayes—Allen, Blackburn, Brown of Chicago, Brown of Pulaski, Cobb, Burchard, Edwards, Flagg, Goltra, Hayes, Johnson, Mahan, McMurray, Pickrell, Pullen, Quick, Scroggs, Van Osdell, the Regent—19.

Noes—None.

The subject of Legislative appropriation was then called up. Mr. Johnson moved that this subject be made the special order for 7 o'clock, and that it be discussed in secret session. After some discussion, on motion of Mr. Flagg, it was referred to the Finance Committee. Carried.

On motion the Board adjourned to 2 o'clock, P. M.

AFTERNOON SESSION.

The Board was called to order at 2:30 P. M.

The following resolutions of Mr. Flagg were taken up and passed:

Resolved, That the Superintendent of the Farm be instructed to report a scheme of Agricultural experiments for the year 1869, to be carried out on the University farm, and also simultaneously at other points in the State, em-

bracing as great a variety of soil and climate as possible; said report to be made to the Board at this meeting if practicable, or if otherwise, to the Executive committee at its next meeting.

Resolved, That said scheme of Agricultural experiments, when revised, corrected and approved by this Board, or the Executive committee, shall be carried out by the Superintendent of the farm and the Corresponding Secretary under the direction of the Regent, and that the Regent be authorized to draw a warrant, or warrants, not to exceed the sum of $500, to meet such expenses as may be incurred in procuring material for, and carrying out these experiments, unless the Legislature shall, at the next session, make an appropriation for that purpose.

Also the following:

Resolved, That the Executive committee be instructed to provide for a course of Agricultural lectures and discussions, to commence about the 12th of January next and continue two weeks, these discussions to be held at the University and free to all persons—and that the attendance and co-operation of the practical farmers of this State is hereby earnestly solicited to aid in making these discussions successful, both in disseminating their views on the best methods of practical farming and in furnishing facts for a science of agriculture.

Carried.

The Committee on Horticulture reported plans and specifications for improvements of horticultural grounds and experimental planting, which, on motion, were referred to the Finance committee.

To the Board of Trustees of the Illinois Industrial University:

The committee on Horticulture respectfully beg leave to report.

Section seven of the Act of Incorporation, among other things, authorizes the Board of Trustees to "establish and provide for the management of said model farms as may be required to teach, in the most thorough manner, such branches of learning as are related to agriculture and the mechanic arts."

As a part of such model farm, and for the more perfect demonstration of that department of agriculture known as horticulture or garden culture, we beg leave to make the following recommendations:

The plat hereunto attached as a part of this report, marked A, exhibits the ground plan of the grounds proposed to be occupied, and the schedule shows how they may be planted, and also contains the list of forest trees recommended for trial.

No extended argument is required at this time to prove the need of teaching the cultivators of the soil the importance of forest tree planting, of orcharding, and of other departments of gardening.

In regard to the orchard proper, the most important feature that we now recommend, is the procuring and planting of samples of all the improved *varieties* of fruits for identification and for comparison—a sort of fruit tree *museum* of varieties, that will be at all times accessible for reference.

The management of the orchard, vineyard and garden will more properly come under the care of the Professor of Horticulture, or head gardener. But we would urge that the grounds reserved for the orchard, be occupied for that purpose at as early a day as possible. The estimate for the cost of trees will be found in the schedule, but that for labor and other material are combined in the ground plan, and its proportion, to some extent, must be left to the discretion of the person in charge of the improvements.

The great feature of these grounds, and what is of paramount importance at this time, to the whole people of the State, is the planting of forest trees for useful purposes. It is a new demand upon their industry and upon their lands, from which they cannot fail to reap the most valuable results.

The new condition of things, created by railroads and improved agricultural implements, present new industries, both to the cultivators of the soil and to the mechanic, in which they have a mutual interest. The forests are rapidly disappearing, or at least those useful trees that have a commercial value, and yet many of the new demands have not been met, nor is the old supply likely to hold out. But, if the forests of Michigan, Wisconsin, Minnesota and Indiana were adequate to the demand, as a matter of economy in freights, if not in the superior quality of our second growth timber, especially of the decideous varieties, it is an object to grow them at home, rather than to buy them.

Timber for railroad ties, culverts, cars, roadways and buildings, fencing, vineyard stakes, hop poles, stanchions for coal banks, soft wood, like white willow and the poplars, for berry boxes, crates and staves; hoop poles, wagon and carriage material, agricultural implements, and the multiform wants of the age, make up a demand of most surprising magnitude, that will add to our rural industry an importance that the most sanguine have not hitherto dreamed of.

If we look at this as simply the demand of agriculture, it must be conceded that it is legitimate and ought to be granted without an objection; but we have added to this the claim of the mechanic, who is also largely interested, for it will enable him to compete with those of other States in the supply that commerce demands.

The State that sells the raw products of its soil is never rich, while the States that manufacture for others do well; those that grow the raw material and manufacture it at home, are the most prosperous. No doubt the State of Illinois had these facts in view when it established this great school of the industries for the especial benefit of those two classes who create the wealth of the State.

There are in this State about eighty species of forest trees, besides the larger shrubs. With the exception of the oaks, yellow poplar and hickory, we have not drawn largely from our native forests; and to-day we purchase nearly all of our timber. Nearly all of the ash timber used for agricultural implements, a part of our fence posts, and a portion of our railroad ties come from other States. Added to these is the greater part of the material for our wagons and carriages, when not wholly manufactured in other States; timber

for railroad cars, and hard-wood lumber for many other useful purposes, that ought to be grown near the place of manufacture.

To bring these useful trees within the bounds of culture and to utilize them, is one of the objects of this industrial institution. To teach the people of the State how to add these products of the forest to their other crops, and thus add millions of dollars annually to the wealth of the State, to give labor a wider range and a more comprehensive field for its employment, are objects worthy of such an institution.

Thousands of acres of timber can be planted in shelter belts, to check the winds that comes down from the north, with its polar cold, destroying the plants that the genial summer, fanned with the breath of the tropics, has made to flourish on our open plains. Wall in these prairies of central and northern Illinois with belts of conifers and decideous trees and we shall have one of the best of climates; genial and equable, and with the best soil in the Union, with a geographical position midway between the two oceans, over which must pass a large part of the commerce of the world, and if we are not laggards in the world's progress we may reap from such surroundings a rich reward.

The Committee have divided these thirty species of useful forest trees into three classes, according to their supposed value for the demands of commerce and for domestic use. In the first class they include the European Larch, Austrian Pine and Norway Spruce, native trees of Europe, and the Osage Orange, native of the Southwestern States. In the second and third class, White Willow, a native of Europe; Black Spruce and Norway Pine, natives of the more Northern States. Thus making up the list with four European, three of other States and twenty-three species from the forests of Illinois.

Our other native trees of minor importance will find a place in the arboretum, where those of other sections of this Continent and of Europe may be tested side by side. It is probable that among them may be found many of value.

The ten acres reserved for a commercial garden and grounds—for the testing of new varieties of plants—for comparing and further testing of old ones—for the proving of new modes of culture and the testing of new implements, cannot fail of proving useful, especially to those students who remain at the University during the spring and summer occupied in some "industrial avocation." As the larger part of this plot of ground will be devoted to a market garden it is hoped that it will prove to be a paying investment.

We recommend the planting of an osage hedge around the two hundred acres embraced in the plat.

We recommend that so much of lot Y as is suitable for the purpose be planted to an experimental orchard of the apple; two trees of each variety; the rows to run North and South, twenty-four feet wide, and the trees twenty-five in the rows; the trees in each tenth row to consist of Norway spruce. In this connection we also recommend that the offer of A. M. Lawver

duplicates of his collection of varieties, be accepted, and the proper order wn for the amount.

Ve also recommend that there be an additional experimental orchard of nty acres, to be located on the stock farm, (Busy farm), for the testing of ieties of the peach, pear, plum, cherry, quince, apricot, nectarine—two es of each variety, to be planted in rows sixteen by sixteen feet, with every th row running North and South to be planted with Norway spruce. rs to be both standard and dwarf; one half of the dwarf pears to be nted eight feet in the row, thus: 8 by 16 feet. The relative value of ıdard quince stock to be tested with same varieties, both as regards market ıe and quality. Cherries to be tried on Morello, Mazzard and Mahaleb ks. The whole to be surrounded with a double row of Norway spruce, eight feet apart. The site selected to be the highest point, or points, best pted to the purpose.

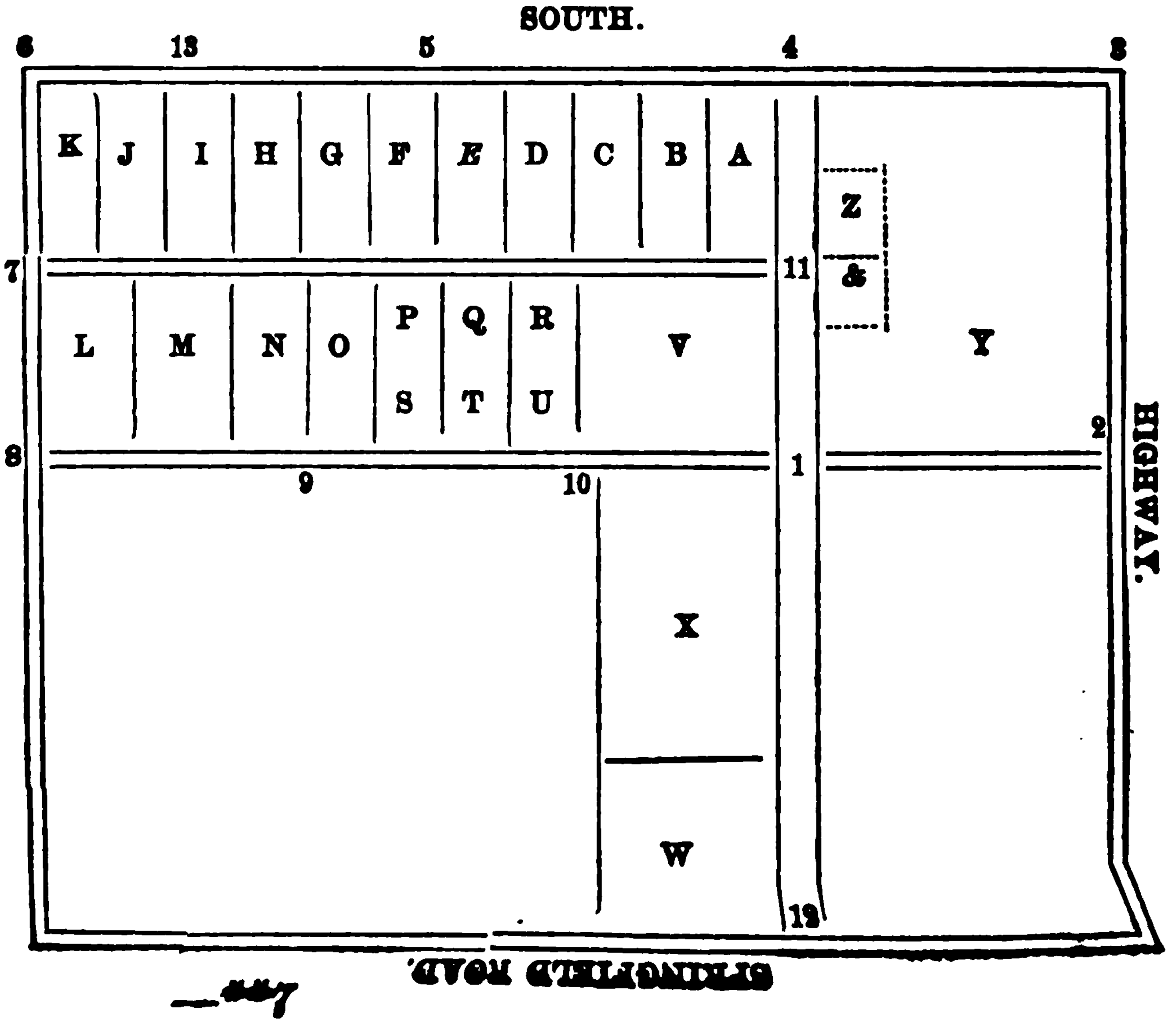
lso, one acre of vineyard, two plants of a variety, and so planted as to the relative value of different modes of training and pruning.

lso, that lot B of the plat, containing one acre, be devoted to the testing iew varieties of the small fruits. It is probable that at some future time ıay be found advisable to extend the plantation of small fruits for market, the purpose of giving employment to those students who may, in accord- e with the law, desire to remain in the University.

Ve also recommend the formation of an arboretum, to be located North of new street that is located East and West on the forty acre tract, to contain ut ten acres, and marked on the plat "W." So far as practicable to make same ornamental, on the ground plan of a park, for the use of the Univer- , and the citizens of Urbana and Champaign.

PLAT A.—SCHEDULE.

SOUTH.



Shelter belt of two rows of trees, the one sixteen feet inside of the hedge and the other eight feet therefrom, and trees eight feet in the rows, as follows:

From	1	to	2,	80	rods	European Larch.
"	2	"	3,	108	"	Norway Spruce.
"	3	"	4,	80	"	White Ash.
"	4	"	5,	80	"	Austrian Pine.
"	5	"	13,	40	"	Silver Maple.
"	13	"	6,	40	"	White Pine.
"	6	"	7,	60	"	Arborvitæ.
"	7	"	8,	48	"	Green Ash.
"	8	"	9,	60	"	Red Cedar.
"	9	"	10,	60	"	Blue Ash.

Avenue 1 " 4, 80 feet wide.
" 7 " 10, 66 feet wide, and may be slightly curved.
Alley west of "A" 33 feet wide.
Alley west of belt 33 feet wide.
Alley A to J 24 feet.
Alley between ——— 24 feet.
Half of street 6 to 8, 33 feet.
Lots A to J each 183 feet wide ——
" A to J each 908 feet long.
" L, M, N, O, each 260 feet wide.
" L, M, N, O, each 669 feet long.
" P, S, Q, T, each 260 feet wide.
" P, S, Q, T, each 335 feet long.
" U, R, each 128 feet wide.
" U, R, each 335 feet long.
Lot V, 10 17-100 acres, 669x662 feet.
" X, about 26 acres, excluding streets.
" W, arboretum, about ten acres.
" Y, enclosure for apples, about 43 acres.
" Z, one acre for gardener's residence.
" &, two acres for Superintendent's house and outbuildings.
Avenue 1 to 12, 80 feet.

USEFUL TREES—FIRST CLASS.

			Estimated Cost.
Lot A,	4 acres	European Larch	$108.80
" B,	4 "	Osage Orange	21.76
" C,	4 "	White Pine	183.20
" D,	4 "	White Ash	65.20
" E,	4 "	Austrian Pine	133.20
" F,	4 "	Green Ash	65.20
" G,	4 "	Arborvitæ	326.40
" H,	4 "	Blue Ash	65.20
" I,	4 "	Red Cedar	54.40
" J,	4 "	Norway Spruce	133.20
	40 acres.		$1,106.56

SECOND CLASS.

Lot K,	2 acres	White Sugar Maple	$37.20
" "	2 "	Black Sugar Maple	27.20
" L,	2 "	American Chestnut (10 bushels nuts)	100.00
" "	2 "	Shellbark Hickory—nuts	15.00
" N,	2 "	Cucumber	54.40
" "	2 "	Norway Pine	326.40
" O,	2 "	Silver Leaf Maple	27.20
" "	2 "	Tulip	43.52
" M,	2 "	White Willow	10.88
" "	2 "	Black Walnut	10.00
	20 acres.		$1,748.36

THIRD CLASS.

Lot P,	1 acre	Red Maple	$13.60
" "	1 "	White Elm	21.76
" Q,	1 "	Red Elm	21.76
" "	1 "	Butternut (nuts)	10.00
" R,	1 "	Catalpa	5.00
" S,	1 "	Hemlock	40.80
" "	1 "	Basswood	27.20
" T,	1 "	White Oak	10.00
" "	1 "	Black Spruce	40.80
" K,	1 "	(South end) Burr Oak	10.00
	10 acres.		$1,949.28

The White Pine, Austrian Pine, Norway Spruce and Hemlock to be planted 8 by 8 feet; all others 4 by 4 feet. The former requiring 680 trees to the acre, and the latter 2,720. The above distances to be varied to some extent by way of experiment, to ascertain, by actual trial, the most proper distances for the planting of the several species.

ESTIMATE OF FUNDS REQUIRED.

Trees, Nuts and Seeds for Forest Grounds	$2,000
" for Orchard (4,000)	1,200
" " Belts	500
" " Orchard on the Stock Farm	2,000
Hedge Plants	18
House for Superintendent	3,000
" " Gardener	500
Barn and Out-buildings	2,000
Farm and Repairs	500
Two Span of Horses	600
Two Wagons and Harness	282
Team hire, Subsoiling or Trench plowing	300
Tile Draining	2,000
Labor, 2 years	7,100
Total	$22,000

We would recommend that the Legislature of the State be asked to make an appropriation of eleven thousand dollars a year, for two years, for the above purpose.

B. PULLEN,
S. EDWARDS,
O. B. GALUSHA,
M. D. DUNLAP,
W. C. FLAGG.

Dr. W. Kile, of Paris, Edgar county, having been appointed by the Governor to the place made vacant by the death of Mr. Geo. Harding, appeared in his seat, and the usual oath was administered to him by Judge Cunningham.

The treasurer, J. W. Bunn, read statement of sale of scrip, and the manner in which the funds have been invested. Referred to committee on Finance.

On motion of Mr. Burchard, the account of balance left in the hands of the Regent was referred to the auditing committee, and he further moved that all of the accounts be referred to the same committee.

The following resolution was then offered:

Resolved, That the committee on Library be instructed to obtain a policy or policies of insurance on the library, instruments, apparatus in the University building, and on all farming implements, and on the buildings in which said implements are housed or stored—to be insured at the full value, or as near thereto as practicable; and the amount sufficient to pay such premiums as may be required is hereby appropriated, and the Regent is instructed to draw a warrant for the same.

Carried.

Mr. Edwards presented the following resolution:

Resolved, That we recognize it as a duty of the Board of Trustee to make this University pre-eminently a practical school of Agriculture and the Mechanic arts.

After discussion, Mr. Cunningham moved to amend, by adding after "arts" the following words, "not excluding other scientifical and classical studies." Pending the discussion which followed, the Regent announced that the students were assembled in the Chapel, and a recess was taken to enable the Trustees to inspect them.

Upon re-assembling, after further discussion, the yeas and nays being called, it was passed as amended by the following vote:

Yeas—Allen, Blackburn, Brown of Chicago, Brown of Pulaski,

Burchard, Cobb, Cunningham, Dunlap, Edwards, Flagg, Galusha, Goltra, Hayes, Johnson, Kile, Lawrence, Mahan, Pickrell, Pullen, Quick, Scroggs, Van Osdell, and the Regent—23.

Nays—McMurray.

Upon motion of J. M. Pickrell it was voted: That the foregoing resolution be furnished to the agricultural and other presses of the State, with request for its publication. A motion to adjourn until 7 o'clock, P. M. prevailed.

EVENING SESSION.

Board called to order at 7 o'clock.

On motion of Mr. Blackburn, it was voted to dispense with the ruling of the morning to debate with closed doors. The report of the Committee of Agriculture was then read, and upon motion, it was referred to the committee on finances.

To the Board of Trustees Illinois Industrial University:

The committee on Agriculture make the following report for your consideration.

1st. That the Stock farm is in such condition as to require for the cultivation of the lands, protection of the crops, repair of building and fences thereon, the sum of three thousand ($3,000) dollars, to be expended as follows:

For the purchase of two teams	$ 800 00
" " of harness	75 00
" " of one wagon	125 00
To be expended in repairing fence	1,000 00
For hedging Stock farm	100 00
Repairing house, barn, and for well and cisterns	1,000 00
	$3,000 00
And in addition, as a contingent fund to meet such necessary expenditures not herein enumerated, but as may be called for,	$2,000 00
	$5,000 00

Your committee likewise recommend, as soon as the finances of the Institution will admit, or can be augmented, that the following amounts be set apart to be expended on said farm:

1. $5,000 for barn and tool house on experimental farm.
2. $5,000 for stock and sheep barn, pens, hennery, pigery, apiary, &c.
3. $5,500, houses for farm laborers and gardners.
4. $5,000 for fencing.

5. $2,500 for tools for farm and garden.

6. $5,000 for stock, neat cattle, sheep, swine, etc.

7. $8,000 for underdraining experimental farm and gardens, 200 acres, at $40 per acre.

8. $2,000 for roads, gates, bridges, etc.

Making in the aggregate, $38,000.

All of which is respectfully submitted.

THOMAS QUICK,
Chairman Agricultural Committee.

The report of the Committee on Mechanical Department was then read, and, on motion, so much of it as relates to estimates was referred to the Finance committee.

REPORT.

The committee on Mechanical Department would respectfully report:

That in their opinion it has become necessary that there should be erected a building for the reception of machinery, for the repair of machinery, and other mechanical work; also, for Art Gallery, etc., etc. Your committee herewith present, a sketch plan, embodying somewhat their ideas; also they herewith present an approximate estimate from Mr. Scarfoss, the present carpenter of the University, giving the probable cost of the building without any engine, shafting, etc., at the sum of $26,000. But your committee would state that, in their opinion, this estimate is too low by $10,000 at least, and would, therefore, give their estimate for said building at $40,000.

J. W. SCROGGS,
Chairman of Mechanical Committee.

On motion, Dr. W. Kile, of Edgar county, was appointed to the place in the standing committee formerly occupied by Col. George Harding, deceased.

The following resolution was offered by Mr. Johnson:

Resolved, By this Board, that the future good of this University requires that we look forward to the removal of the present University buildings to the Busey farm, and that all improvements now made be in conformity thereto.

Motion to lay on the table prevailed.

Mr. Johnson offered the following resolution:

Resolved, That female students be admitted to the benefits of this University upon the same terms and requirements as male students, except the requisitions for military study and drill.

After discussion, Mr. Flagg offered the following substitute:

Resolved, That from and after the commencement of the Fall term of 1869, female students shall be admitted to the lecture and recitation rooms of the University.

On motion, the substitute was laid on the table. Mr. Quick

a reconsideration. Carried. Question: Shall the substi- on the table? Voted nay.

motion, the whole matter was referred to full Board at nnual meeting. The ayes and nays being called for, re- as follows: Ayes—Allen, Blackburn, Brown of Pulaski, of Chicago, Burchard, Cobb, Goltra, Kile, Lawrence, , Pullen, the Regent—12. Nays—Dunlap, Edwards, Cunningham, Galusha, Lawrence, McMurray, Pickrell, Scroggs, VanOsdel—11.

I. Brown offered the following resolution:

ed, That a committee of three, of which the Regent shall be Chair- appointed, whose duty it shall be to prepare an address to the ure setting forth fully and in detail the plans of the Board for the ment of the lands of the University, and the increase of its facilities hing, the importance of carrying out these plans and the necessity for n the State in carrying them out, with estimates of the amounts l.

pted.

Auditing Committee, to whom was referred the Treasurer's Report, amined the same and compared his vouchers with his accounts, and same entirely correct; that he has exhibited warrants drawn by the numbered 16, 34, 58, 105, 145, 151, 153, of old numbers, and of No. 1 inclusive, except No. 113, of 2nd series, and we recommend that the er be ordered to cancel said warrants so paid by him, and hold the

L. W. LAWRENCE,
A. M. BROWN,
H. C. BURCHARD,
SAMUEL EDWARDS,
O. B. GALUSHA,
Auditing Committee.

following resolution, offered by H. C. Burchard, was then d:

ved, That the Treasurer, under the direction of the Chairman of the Committee, be authorized to invest in the bonds of Counties of this rawing ten per cent. interest, whenever the same can be safely done, n of the land scrip funds now temporarily invested in Illinois six per nds.

the following:

ved, That the Treasurer be authorized to pay the taxes on the lands by the University, and that the Regent issue warrants in his favor a sum as may be necessary.

ried.

motion of *Mr. Edwards*, the Chairman of the Auditing Com-

mittee was requested to look over the accounts and report to the Executive Committee.

On motion of Judge Brown it was—

Resolved, That the Regent be authorized to secure from Mr. Lawver the apple trees referred to in the report of the Horticultural Committee, upon the best terms, as to price and time of payment, that he can obtain.

Amendment by Mr. Galusha, that Judge Brown be substituted for the Regent.

Amendment agreed to.

The following preamble and resolution by Mr. Blackburn, relating to the decease of Colonel George Harding, was then presented:

WHEREAS, This Board, with deep felt sorrow, has learned since its last meeting of the death of Colonel George Harding, one of its most faithful and efficient members, and an earnest and devoted friend of industrial education.

Resolved, That we express our heartfelt sympathy with the bereaved family and friends in this irreparable loss.

Resolved, That a copy of the above resolution be forwarded by the Recording Secretary to the widow and family of the late Colonel Harding, and that it be entered upon the minutes of this Board.

It was voted that it be so done.

The Finance Committee then reported back the report of Treasurer on sales of scrip, which was accepted.

Report of sale of the Agricultural College scrip, sold for account of the Illinois Industrial University:

96,160	acres sold at 56 5-16 per acre	$54,150.10
48,000	" " " 56 1-2 " "	27,120.00
32,000	" " " 56 7-8 " "	18,200,00
1,280	" " " 58 cents " "	742.40
1,280	" " " 60 " " "	768.00
960	" " " 61 " " "	585.60
320	" " " 62 " " "	198.40
180,000	acres sold for	$101,764.50
35,520	acres sold at $93.18¾ per 160 acres	$20,687.61
32,000	" " " 93.37½ " " "	18,675 00
16,000	" " " 93.50 " " "	9,350.00
1,120	" " " 93.60 " " "	655.20
8,000	" " " 94.10 " " "	4,705.00
2,560	" " " 94.00 " " "	1,504.00
640	" " " 94.40 " " "	377.60
4,000	" " " 95.10 " " "	2,377.50
160	" " " 96.00 " " "	96.00
100,000	acres sold for	$58,427.91
100,000	**acres sold for**	**90,000.00**

RECAPITULATION.

180,000 acres sold for	$101,764.50
100,000 " " "	58,427.91
100,000 " " "	90,000.00
Total	$250,192.41
Invested as follows:	
40,000 Champaign Co. bonds, 10 per cent., int. payable annually May 1st	$40,000.00
50,000 Sangamon Co. 9 per cent., int. payable semi-annually, 1st of April and 1st of October	50,000.00
25,000 Morgan Co. bonds, 10 per cent., int. payable annually, June 15th	25,000.00
25,000 Chicago city 7 per cent. water bonds, int. payable semi-annually, July and January	24,961.80
109,000 Illinois 6 per cent. bonds—cost par and interest	110,153.34
Invested	$250,115.14
Balance for scrip on hand	77.27
Total	$250,192.41

SPRINGFIELD, November 17th, 1868.

JOHN W. BUNN, *Treasurer.*

REPORT OF FINANCE COMMITTEE.

To the Board of Trustees Illinois Industrial University:

The Finance Committee would submit the following suggestions:

Our March estimates for the receipts of the current year, together with money then in the hands of the Treasurer, amount to $33,373 10. Our estimates of expenses for same time amounted to $28,295 10. Upon looking over the Treasurer's report, we find that $26,000 has already been used, leaving only 2,0 for the next four months, appropriated. As the various committees have not reported what they will probably need for their departments for the balance of the year, we cannot ask, at this meeting, for any further appropriations. The current salaries, however, amount to about $1500 per month. The Treasurer reports amount on hand at this time at about $6000, which would cover this expense, leaving the January interest and other receipts, which he estimates at 5,000, to pay any other expense that may be ordered by this Board or the Executive committee between now and the March meeting.

The Executive committee ordered the sale of 50,000 acres of land scrip, at $1 10. We have not been able to sell at these figures. This committee would ask further instructions from the full Board in regard to this matter.

The 25,000 acres of scrip authorized to be located, has, as yet, not been effected. This committee would recommend that the Treasurer and Mr. Goltra be authorized to make such locations.

Also that said Treasurer be authorized to get up a set of scrip and land books, with appropriate headings; scrip book to contain statement of scrip sold, to whom, price, number, etc., scrip located, and by whom, State, subdivision, etc. Land book to contain full description of all land located, State, township, range, etc., with such remarks as the persons locating it can furnish.

All of which is respectfully submitted,

EMERY COBB,
J. O. CUNNINGHAM,
J. H. PICKRELL,
H. C. BURCHARD.

The report of Finance committee on Agricultural, Horticultural, and other appropriations, was then accepted.

REPORT.

The Finance Committee, to whom was referred the subject of asking appropriations from the Legislature the coming winter, would recommend that this Board appoint a committee to bring the matter before said body—being particular to specify each and every item. Said amounts so referred are as follows:

For Horticultural Department,	$22,000
Polytechnic and Mechanical Department	40,000
Agricultural Department	38,000
	$100,000

The committee on Agriculture ask for an appropriation of $3,000 for fences, hedges, teams, etc. The committee report that said amount be appropriated out of our income account, unless we get the above appropriations from the Legislature.

(Signed)

EMERY COBB,
J. H. PICKRELL,
WM. KILE,
H. C. BURCHARD,
J. O. CUNNINGHAM.

Judge Brown then offered a resolution that the committee be authorized to sell fifty thousand acres of scrip at a price not less than 95 cents an acre.

An amendment, that the minimum be 100 cents per acre, was lost, and the question upon the resolution to sell at not less than 95 cents per acre prevailed.

On motion of Mr. Burchard, it was

Resolved, That in addition to the appropriations requested by the committees on Horticulture, Agriculture and Mechanical departments, to be made by the Legislature, an appropriation also be asked for the Library, Chemical and Philosophical apparatus, Cabinets, etc., at least of 25,000.

Mr. Cobb and Mr. Lawrence were appointed a committee to prepare a memorial to the Legislature. On motion of Mr. Cunningham, Mr. Goltra was added to the committee.

It was moved and seconded that the Board stand adjourned until the annual meeting.

Carried.

JONATHAN PERIAM,
Recording Secretary.

REPORT OF THE RECEIPTS AND EXPENDITURES OF THE ILLINOIS INDUSTRIAL UNIVERSITY.

RECEIPTS.

1868.			
March	11	Balance on hand	$10,536 39
"	30	Rent from A. Chase	15 36
"	30	Interest on Illinois Bonds	325 00
April	11	J. M. Gregory for freight for self	298 19
"	11	Tuition 43 students at $5.00	215 00
"	11	Incidentals, 75 students, at $2.50	187 50
"	11	Matriculation, 75 students, at $10.00	750 00
"	11	Room rent	221 50
May	4	Amount refunded by M. C. Goltra	1,185 10
"	18	J. M. Gregory for freight on lumber	350 99
"	18	Interest on Champaign County Bonds	10,000 00
July	6	" on $109.000 Illinois 6 per cent	3,270 00
"	6	" on $25,000 Chicago Water Bonds	875 00
"	11	R. M. Eppstein & Bro. for University Buttons	65 55
Aug.	10	J. M. Gregory for hay and corn	429 84
"	21	J. M. Gregory for freight refunded	40 05
Oct.	1	Interest on $50,000 Sangamon County Bonds	2,250 00
Nov.	1	Jonathan Periam for hay, corn and feed	127 60
"	16	J. M. Gregory for tuition, etc	1,000 06
			$32,143 00

EXPENDITURES.

Amount paid for expenses of Trustees	$794 90
" " " salaries, wages, etc	10,372 06
" " " library, chemical apparatus, mathematical instruments etc.	2,314 55
" " " printing, advertising and stationery	696 66
" " " labor, materials, and University grounds	3,501 43
" " on account of farm	4,739 89
" " " students labor	550 08
" " " one lot	230 00
" " " locating lands	200 00
" " " furnace, furniture, etc	947 75
" " " lumber	1,498 55
" " " freight and express charges	122 00
" " " examining and recording title and deeds	114 25
Balance on hand	$6,140 99
Total	$32,143 06

SPRINGFIELD, November 17th, 1868.

JOHN W. BUNN, *Treasurer.*

THIRD ANNUAL MEETING.

URBANA, ILL., *March* 12, 1869.

The Board of Trustees of the Illinois Industrial University met in the library at the University building, at ten o'clock A. M., and was called to order by J. M. Gregory, the Regent. The meeting was opened by reading the scriptures and prayer by the Rev. Isaac S. Mahan.

The following members answered to their names: Allen, Blackburn, Brown of Pulaski, Cobb, Dunlap, Edwards, Pearson, Galusha, Goltra, Lawrence, Mahan, Pickrell, Wright, Van Osdel, the Regent—15;

Which being two less than a quorum, on motion of Mr. GOLTRA, the Board adjourned until two o'clock.

TWO O'CLOCK, P. M.

Board met pursuant to adjournment, at two o'clock, P. M., and the following gentlemen answered to their names: Messrs. Allen, Blackburn, Brown of Pulaski, Burroughs, Cobb, Dunlap, Edwards, Pearson, Galusha, Goltra, Lawrence, Mahan, Pickrell, Wright, Van Osdel and the Regent—16, lacking one of a quorum.

On motion of Mr. COBB, the Board adjourned to 4:30 P. M.

HALF-PAST FOUR, P. M.

The Board met pursuant to adjournment, at 4:30 P. M., the Regent in the chair. Upon calling the roll the following members answered to their names:

Allen, Blackburn, Brown of Pulaski, Burroughs, Cobb, Dunlap, Edwards, Pearson, Galusha, Goltra, Lawrence, Pickrell, Pullen, *Wright, Van* Osdel, the Regent—16, still lacking one of a quorum.

On motion, the by-laws adopted by the Board were read as far as Article VII, when, on motion, the further reading was dispensed with.

On motion of Judge BROWN, the Board adjourned to the next day, March 10, at nine o'clock, A. M.

SECOND DAY—MORNING—MARCH 10, 1869.

The Board met at ten A. M., pursuant to adjournment. Reading of scriptures and prayer by Mr. LUTHER LAWRENCE. Present, Messrs. Allen, Blackburn, Brown of Pulaski, Burchard, Burroughs, Cobb, Dunlap, Edwards, Pearson, Galusha, Goltra, Lawrence, Kile, Pickrell, Pullen, Wright, Van Osdel, the Regent—18.

Minutes of the previous meeting were read and approved. The minutes of the last meeting of the Executive Committee were read and approved.

Resignation of Jonathan Periam, as head farmer, on motion of Mr. BURCHARD, referred to the Committee on Agriculture.

Mr. LAWRENCE was called to the chair and the report of the Regent was read, except the concluding portion, for which time was asked.

ANNUAL REPORT OF THE REGENT.

Gentlemen of the Board of Trustees :

The By-Laws require the Regent to make "An Annual Report to the Board exhibiting the progress and condition of the several departments of the University, with such suggestions as he may deem needful for their improvement." The present report marks the close of the first year of actual work of the University. This fact lends to this annual review both interest and importance.

The University was opened for the reception of students the second day of March, 1868. During the brief year allowed for maturing our plans and preparing for the opening, strenuous efforts were made to advertise the University thoroughly throughout the State. The Regent visited many counties and addressed agricultural fairs, and other gatherings of the people. A competitive examination was held in most of the counties, for students, and both the State Superintendent of Public Instruction and the County Superintendents of Schools gave hearty and efficient aid to make the new institution favorably known among the people. The applications for admission were numerous

and but for the false charges which were made against the University before it had put in operation a single plan or done a single day's work, it seemed certain to open with at least 200 or 300 students. There is evidence that many were diverted from their purpose of coming by these mischievous assaults. But notwithstanding all opposition, the first term showed an attendance of seventy-seven students. The second or autumn term opened with a considerable increase of numbers. The entire number who have entered up to the present time is 136.

The distribution of the students in the several courses cannot be precisely stated, since many have been engaged in preparatory studies, and many have not decided upon their course. It is believed that nearly one-third of the whole number are looking to the agricultural course. Several are entering the mechanical course, while others are pursuing engineering or commercial courses.

The instruction was given in the spring term by four instructors, the Regent, Professors Baker and Atherton, and Assistant Professor Burrill. There are now actually employed beside the Regent, three Professors and three Assistant Professors, representing the departments of History, English Language, Chemistry, Agriculture, Botany, Mathematics, Book-keeping and Modern Languages. Besides these, there are two lecturers, one on Pomology, Dr. John A. Warder, of Cincinnati, and one on English Literature, Rev. Edward Eggleston, of Evanston. Professor Powell, appointed by the Board to the chair of Natural History, has tendered his resignation on account of his continued detention with his expedition. I communicate herewith his letter of resignation and also that of Professor Atherton.

It is important that several additions be made to the Faculty before the opening of the next year, in September. The chairs of Horticulture, Mathematics and Mechanics, and either a professor of Natural History or one or two lecturers in this department should be chosen. A lecturer on Geology and another on Zoology, each spending a month with us in the winter term, would sufficiently reinforce those departments of study for the present.

A lecturer on Veterinary Science should also be appointed at an early day. I recommend that the Committee on Faculty and Courses of Study be instructed to recommend suitable persons to fill these places, and employ temporarily such teachers as may be needed before the next meeting of the Board.

STUDIES.

According to the plan of the University the students have been left entirely free to select their own studies. These students are not mere boys, but mostly grown men, many of them having been engaged in teaching or other independent business for their own support. They are competent judges of their own tastes and needs. To attempt to impose any study upon them without their consent would be simple oppression, and to refuse them any study the law requires us to teach would be equal oppression.

Most of the students have studied during the year some branch of Natural *Science, as* Natural Philosophy, Chemistry or Botany. Many have studied *Book-keeping*, English Composition, History, and all have either studied or

attended lectures on Agriculture. A considerable number, and always at their own option, have studied either the ancient or modern languages. Considering the somewhat violent prejudices which many persons have conceived against the languages, it is perhaps a pity that these young men should have chosen to embrace language among their studies. But as none of the so-called, more practical studies have been neglected on account of the languages, we may leave these students without offence to gain the advantages or suffer the loss resulting from their choice.

I cannot forbear to remark here, that to my mind it is a most pitiful business that any one should have narrowed this magnificent question of industrial education down to a petty debate on the study of languages—a matter which seems to me as irrelevant as the question whether students shall eat butter with their toast, or take sugar in their coffee—and a matter over which we as trustees have little or no control, since the laws of Congress and of the State forbid the exclusion of classical studies.

The Faculty, without exception, came from the laboring classes. They were all trained in boyhood to hard labor, and, by their own industry, won and paid for the education which now enables them to teach others. Becoming educated men, they have not ceased to be practical men—farmers and mechanics. Holding each a different creed, they work with one heart for interests broader than sects, and dear as humanity itself.

CHEMICAL LABORATORY.

The chemical laboratory has been opened for students, and I submit herewith Prof. Stuart's plan of compensation for chemicals used by students. In January Dr. Warder gave a course of twelve lectures on vegetable physiology and fruit growing, which were attended by the entire body of students. Most of the students also attended the lectures and discussions of the Farmers' Institute held at the University in January. The influence of these lectures was happy, in helping to create a fresh interest in agricultural affairs.

STUDENT LABOR.

During the spring term the students labored two hours each day. In the autumn the time was reduced to one hour per day, as we were unable to provide employment for so large a number of students for a longer time. The labor system has cost much solicitude and care on the part of those managing it, and it will always be attended with many difficulties; but so manifold are its advantages that we may well question whether it ought not to be persevered in against even greater obstacles. It is difficult to see how we are to give the practical character and bearing we all desire to our courses of instruction, without these practical exercises on the farm, or in the gardens. All book study tends to grow unpractical and abstract. It must be closely linked with the daily exercise of the senses and muscles in the same field of study, if you will insure it against dwindling to mere theorizing.

It is often urged upon us by those who never stop to inquire into the facts, that our students will be farmers' sons, who get their practice at home. Now it happens that a large *proportion of* our agricultural students come from th-

cities or villages, and are the children of merchants, lawyers, etc., who often desire to make farmers of their sons. Such was also the case at the Michigan Agricultural College, while I was acquainted with it, and such will be largely the case with all the agricultural colleges. This is a fact we should hold in mind, or as trustees we may be imposed upon by unfounded assumptions.

But while these students of agriculture, who come not from the farms, certainly need the practical training furnished by the labor plan, those who come from the farms will be more helped than hindered by the fresh practice, tice, under different guidance, which they find here. I do not stop to urge again the considerations of health, of physical culture, of honor done to labor, and of the aid furnished to indigent stndents, by the labor system. It is useful for all these reasons, but it seems indispensable as a part of a practical education. It is certainly a very significant fact that most of the agricultural colleges are adopting it. The Massachusetts Agricultural College requires one hour a day. Maine also requires it. Michigan has maintained it for years. Iowa and Kansas require labor; and President White, of Cornell, said lately that a labor system to enable students to pay their way is *desirable*, but educational labor is *essential*.

The main difficulty of the labor system is to apply the labor effectively and profitably. To accomplish these ends, the labor should be performed in small parties, and under close supervision. I am inclined to believe that the maximum rate of compensation should be raised to twelve and one-half cents an hour, which is the price paid for volunteer labor. Inferior wages tempt to inferior performance of work. But lower rates may be paid for young or inferior workmen, and forfeiture of some part of the wages may be imposed for unexcused absence, or gross neglect of duty in the labor. Mechanical students ought, as far as practicable, to be furnished with mechanical labor.

I would also suggest that lots of half an acre or one acre be allowed, under proper conditions, to such students as may desire it, for experiments in agriculture or horticulture.

THE FARMS.

The work upon the farm and garden during the past year has already been reported to you in the report of Mr. Periam, the Head Farmer, made in November last. Much could not be done with the very limited means at our command, but Mr. Periam accomplished a good season's work in preparing the grounds for future cultivation. His services have been quite valuable and important.

The Griggs farm was rented for $1175.

A considerable part of the stock and experimental farms were rented, under such stipulations as to crops and culture as would best prepare them for their future uses. The rents received in kind for the portions so rented are estimated at $————. The remainder of these farms have been cultivated by the University force.

We are now prepared to begin the development of the several farms with reference to their final use. The Board will remember that, according to the *plan of organization* early adopted, the Professor of Agriculture is the Super-

intendent of the Farms—these being his laboratory and apparatus of illustration. It was also provided that his plans for the management of the farms should be annually submitted to the Regent and Faculty, and, after discussion and adoption by them and the Trustees or Executive Committee, shall be put on record. I have the pleasure to submit herewith Prof. Bliss' plans of management for the farms for the current year, which have been discussed and concurred in, though not formally adopted by the Faculty. To make clear the aim and scope of his plans for the year, he has presented a series of diagrams, exhibiting the proposed rotation of crops on the stock farm for the next ten years.

Accompanying this report, I submit a paper from Prof. Bliss, prepared by my request, and a plot illustrating his suggestions regarding the ultimate subdivision of the Experimental Farm. I concur heartily in his suggestion of the need of an intelligent foreman to aid in carrying out the practical work on the farms, and recommend that he be authorized to employ such foreman at a reasonable rate, and also such other farm laborers as may be necessary.

The 200 acres lying nearest the University will doubtless be found sufficient both for the horticultural grounds and the experimental farm. The plan accompanying this report exhibits the proposed distribution of this 200 acres, which is as follows, beginning on the north, next the street railroad:

For arboretum, ten acres.

Allowing sixty trees to the acre, which it is believed would leave abundant space for the paths and drives, this would afford room for 600 trees. Only eighty species are reported as indigenous to Illinois. But a much larger number can be acclimated here from other parts of this continent, and from the old world. The arboretum should be divided so as to exhibit, as far as practicable, the trees of each quarter of the globe by themselves. A distinct department should be made of the Illinois trees.

Next the arboretum, if the ground is suitable, may be placed the nurseries, occupying five acres.

Next this is the market garden, ten acres.

These two departments, which will furnish considerable labor for students, will thus be found near at hand.

Next may follow the small fruit plantations, viz;

For strawberries, two acres.

For raspberries, blackberries, etc., two acres.

For currants, gooseberries, whortleberries, two acres.

For grapes, two acres.

These plots will be large enough to exhibit the several varieties of these fruits.

This will bring us near a swale or slough susceptible of perfect drainage, but probably unsuitable, on account of its greater liability to early frosts, to most of horticultural purposes. It may be used for the cranberry or other shrubs or trees loving a wet soil.

Passing this swale we again reach high ground, where we may plant our specimen and experimental gardens requiring five acres. In this garden we

should exhibit as large a variety as possible of culinary vegetables; carefully measured plots should also be provided here for experimenting with the different fertilizers and modes of culture.

Through the 160 acre lot, two farm avenues should be extended, one from north to south and the other from the east to the west. These may be lined on either side by deciduous or evergreen trees, serving at once to give beauty and to serve as shelter belts. Near the outer gateways, opening into these avenues, small and tasteful cottages should be placed both to accommodate the farm laborers, and to provide protection for our grounds. The grounds embracing about fifty-three acres west of the north and south avenue is judged to be fit for orcharding, and may be occupied as follows:

1.	By specimen apple orchard, sixty trees to the acre, planted in quincunx order	25 A
2.	Market apple orchard of approved varieties	10 A
3.	Cherry orchard	5 A
4.	Pear orchard, dwarf and standard	5 A
5.	Peaches, plums and other fruits	5 A
6.	Roads and shelter belts	3 A

These orchards should be well protected by both hedges and a paling fence, and may be surrounded by a shelter belt of evergreens.

East of the north and south avenue there will be found abundant space and favorable grounds for the farm experiments. Room will be found here also for the plots spoken of for students.

East and south of the crossing of the farm avenues will be found a favorable site for a superintendent's house and a large barn, unless it is deemed best to place these at north entrance to the experimental farm. A plan and estimates for a barn are herewith presented, as also plans for laborers' houses.

HORTICULTURAL GROUNDS.

There is herewith presented a colored plan for the ornamental grounds about the University building, and some plans are expected to be contributed by Mr. Letz, of Chicago, for the glass structures needed. It is hoped that some part of these structures may be erected the current year. Mr. Franks, the gardener, has made good use of the small propagating house erected last fall, and has a large number of bedding plants to adorn our grounds this summer. A small appropriation is asked for seeds, ornamental trees and shrubs and tools for this department, as stated in the accompanying schedule.

An appropriation of $600 is needed for seeds, stocks, and young trees for the nurseries. We have a bill of imported evergreens offered us at rates which seem quite favorable, with a guarantee of excellent condition.

The 3,000 specimen apple trees already received, will cost $750. Other trees, for orchard and arboretum, needed this spring, will cost about $700.

The entire orchard grounds, and as much as practicable of the gardens, should be underdrained at once. One main drain has already been put down through the ornamental and parade grounds. Another should be made at once on the west side. Hedges also may be set at once along the east and west lines of garden plots and experimental farms.

It is asked that a strip fourteen feet wide be relinquished to the public from ıe west side of the forty acre lot. This will make the line correspond with ıe west line of the University grounds and make the street of equal width ıroughout.

I recommend also that a proffer be made of one-half of a four rod street ong the north line of experimental farm, between Wright street and Mt. :ope avenue.

In order to save to the Trustees the opportunity to buy the two lots which :parated our lots south of the Springfield road, and which I judged would e needed in time for buildings, I purchased these lots at very reasonable rates, ad now hold them subject to the decision of the Board. The purchase price 'as $400.

MECHANICAL.

The shop erected last summer will not be sufficient for our work if much uilding is to be done this summer. I recommend that the stable now occuying one part of it be vacated and the whole be fitted up as a shop. We ave several students in the mechanical course who have sought for practice ı the shop, and are already exhibiting some skill in the use of tools. If a ıpply of tools can be furnished they will render effective service in our buildıg operations.

We shall need at once some draughting tables or stands for the students in echanical drawing. It should not be forgotten that instruction in Mechan- s is as obligatory upon us as instruction in Agriculture, and a Professor in ıis department should be put on service at the opening of the fall term at test.

THE UNIVERSITY BUILDING.

The intense heat of the last summer so nearly ruined the slate composition ofing, that only by repeated patching have we been able to keep out the ins. It is evident that the roofing must at once be replaced by something ore substantial. I recommend that a good tin roof be put on and well .inted.

A slight inspection will also convince you that something must be done ımediately to preserve the brick of the basement story from further decay. good coating of stucco or mastic might perhaps suffice. The steeple and rnice need repainting, and I recommend also that the side walls in the sevıl halls be painted to some height at least, that they may be more easily ıshed and kept clean.

An ornamental gateway, the gift chiefly of Mr. John Burchard, of Beloit, ready to be erected at the main entrance.

The sidewalk on the west front should be extended to the Springfield road, not across the brook.

FINANCES.

[report herewith a statement of the warrants issued during the year. The ıal expenditure for all purposes, not including the railroad donation, nor › trees, etc., donated by Champaign county, from Dunlap's nursery, is

$36,698 03. The purposes for which these expenditures have been made, are submitted elsewhere.

These expenditures have slightly exceeded the estimates for the year, but a portion of them has been made in anticipation of the appropriation, and are properly chargeable to it as permanent improvements. Some considerable income may yet be expected from the sale of farm produce now on hand and from rents.

The Treasurer's report will give you a statement of the receipts of the year.

The amount received on account of the Illinois Central Railroad freight donation, up to March 1st, is $3.

The accompanying statement will show the number of trees and shrubs received from Mr. Dunlap, together with the sizes of the same. These have been taken by actual count and measurement on the ground made by the gardener. A few trees, which were mostly overgrown when received, have died, an account of which is added. Mr. Dunlap has not yet presented any written statement of the account. The officers who received these trees had nothing to do with fixing prices, those being determined by the deed of gift as at "catalogue rates." It will be necessary, therefore, for the trustees to settle the account thus far, and decide how much more is due on the donation.

An application was made in due form to the Legislature for an appropriation for the several departments, and copies of the memorial prepared have already been seen by you. A bill making an appropriation of $60,000 has passed the House of Representatives and is now pending before the State Senate.

Patents have already beed issued for most of our lands, and taxes have begun to accrue. Ought not some plans and terms of sale of these lands to be adopted at once?

LIBRARY, CABINETS AND APPARATUS.

Some additions have been made to the library since the last meeting of the Board, but it is still wholly inadequate to our needs. If the appropriation now pending is passed, I recommend that the Library Committee be authorized during the coming summer to make such purchases as are needed.

A paper relating to botanical excursions, proposed by Assistant Professor Burrill, is herewith submitted. I heartily recommend that he be furnished with the necessary materials and outfit, and that as far as practicable he and his class be encouraged to make excursions, if not in term time, at least, in the vacations.

The cabinets we have in possession are here only on exhibition, and are offered for sale. Measures should be taken this present year to begin the collection of cabinets.

A set of meteorological instruments ought to be provided at once, that a series of regular observations may be opened here at an early date. I am informed that a full set will cost $100.

HONORARY SCHOLARSHIPS, ETC.

The language of the statute, strictly construed, restricts the honorary or free :holarship provided for each county to the descendant of a soldier or sailor. ; is, however, permitted to the Board to provide other honorary scholarships. a order to give some regularity to this business, I recommend that it be pro. ided by resolution that when the regular honorary scholarship in any county s not claimed, one free or honorary scholarship be offered to such student as hall pass the best examination and shall be of good character and promise.

There is already one application from a graduate of a college to come here .nd study as a resident graduate. Other applications of this sort may be re- :eived. I would recommend that a rule be adopted that resident graduates)e admitted on the payment of the ordinary fees, excepting the matriculation 'ee.

On motion of Mr. BURROUGHS the report of the Regent, with the accompanying documents, was referred to the proper standing committees.

Mr. BURROUGHS' resolution was as follows:

Resolved, That the different subjects contained in the Regent's report be referred to the several committees on the subjects, for the coming year, and that a committee on nominations be now appointed to bring in, as soon as possible, names of such committees.

Carried.

On motion, Messrs. Lawrence, Edwards and Goltra were appointed a Committee on Nominations.

On motion of Mr. GOLTRA, Mr. J. S. Slade was invited to take a seat with the Board.

Moved and seconded that the new members be sworn in.

Carried.

Messrs. Pearson, Griggs, Kile and Wright were then sworn in, Judge Ayres administering the oath.

On motion, the report of the Treasurer was read.

TREASURER'S REPORT.

November 13, 1868.	By balance	$6140 99
December 9, 1868	By J. M. Gregory, tuition, etc., balance for fall term	169 50
January 4, 1869.	By interest on $109,000 Illinois bonds	3270 00
January 4, 1869.	By interest on $25,000 Chicago water bonds	875 00
January 27, 1869.	By J. Periam, sales of farm produce	328 84
January 27, 1869.	By J. Periam, notes for rent of land	468 75
March 5, 1869.	By J. M. Gregory, collection of fees for winter term	785 50
		$12,038 08

To amount paid for salaries	[illegible]
To amount paid expense of trustees	[illegible]
To amount paid salaries, expenses, for lecturers	[illegible]
To amount paid for insurance	[illegible]
To amount paid Superintendent's salary and labor for farm	[illegible]
To amount paid students' labor	[illegible]
To amount paid for printing and advertising	[illegible]
To amount paid for coal and wood	[illegible]
To amount paid for wages of carpenter, gardener and janitor	[illegible]
To amount paid for library apparatus and cabinet	[illegible]
To amount paid for freight and express charges	[illegible]
To amount paid for stationery	[illegible]
To amount paid for draining tile	[illegible]
To amount paid for labor, material for University and grounds	[illegible]
Balance on hand	[illegible]
	$12,[illegible]

CHAMPAIGN, ILL., *March* 9, 1869.

JOHN W. BUNN,
Treasurer.

[The above report, as will be seen, embraces only the latter part of the year, from November 13, 1868. The report for the first part of the year was made to the Board at the meeting in November, 1868.]

On motion of Mr. BURCHARD, the report of the Treasurer was referred to the Auditing Committee.

Then the report of Committee on Military Department was received.

On motion of Mr. BURCHARD, it was received and laid on table for future action.

Judge BROWN offered the following resolution:

Resolved, That the Treasurer be authorized to sell 50,000 acres of the remaining land scrip, at such prices as he may be able to obtain: *Provided*, he shall not sell at a lower price than may be approved by the Finance Committee.

On motion of Mr. PEARSON, it was laid on the table until Thursday morning, March 11.

Judge BROWN moved then, that the Finance Committee be instructed to devise and report to the Board a plan for putting on the market and selling the lands entered by virtue of the Congressional scrip issued to this University.

On motion, the bills and accounts now in the hands of the Regent were referred to the Auditing Committee.

Mr. J. H. PICKRELL offered the following resolution:

Resolved, That the boarding arrangements made with Mr. Aaron Potter, as set forth on page 93 of Annual Report, be annulled, and that the Executive Committee are directed to sell or otherwise dispose of the fixtures, and give Mr. Potter notice to vacate the premises.

Carried.

Mr. M. L. DUNLAP moved that the Committee on Library and Cabinets be directed to settle with Prof. Powell in regard to specimens of natural history, and that any expense incurred in relation to same be paid out of the library fund.

Laid on the table.

Mr. EDWARDS made the motion that Messrs. Edwards, Pearson and Pullen be a committee of three to make a final settlement with Mr. Dunlap in regard to the donation of $2,000 worth of trees and shrubbery, and report the same to this Board before its adjournment.

Carried.

Motion to adjourn until two o'clock P.M. prevailed.

TWO O'CLOCK P.M.

Board met pursuant to adjournment—Regent in the chair.

On motion of Mr. PICKRELL, Mr. Slade was asked to take his seat, and be qualified as soon as the proper officer should arrive—telegram having previously been read from Senator Flagg, stating that the new Trustees had been confirmed by the Senate, except Mr. Scott.

The committee to which was referred the nomination of the standing committees made their report.

A motion to recommit their report was carried.

The committee then reported back the following nominations, as amended:

Executive Committee—Regent, Cobb, Brown of Pulaski, Pickrell, Cunningham, Griggs, Goltra, Pullen and Wright.

Agricultural Department—Pickrell, Johnson, Allen, Kile and Blackburn.

Horticultural Committee—A. M. Brown, Pullen, Galusha, Pearson and Edwards.

Finance Committee—Cobb, Burchard, A. M. Brown, Pickrell and Griggs.

Building and Grounds—Goltra, Van Osdel, Griggs, Cunningham, Johnson and the Regent.

Auditing Committee—Lawrence, Dunlap, Cunningham, Pearson and Galusha.

By-Laws—Burchard, Lawrence, Slade and the Regent.

Faculty and Course of Study—Regent, Edwards, Pickard, Hayes, Bateman and Blackburn.

[Mr. Griggs substituted for Mr. Pickard. See page —.]

Military Affairs—Brayman, Dunlap, Scroggs, Kitchell and Kile.

Library and Cabinet—Regent, Bateman, Mahan, Allen, McMurray and Slade.

Mechanical Department—Van Osdel, Brown of Chicago, Dunlap, Goltra and Griggs.

On motion, the nominations were adopted.

The question arising whether, in the election of officers, a majority of the full Board should be required to elect, or only a majority of the members present,

Mr. Pickrell offered the following resolution:

Resolved, That in the election of officers, a majority of the members present (being in all cases a quorum) shall only be required; and that all resolutions and rules of the Board in conflict with this resolution are hereby repealed.

Carried.

Judge Brown moved that the Board proceed to the election of officers.

Carried.

On motion of Mr. Lawrence, the subject was deferred, and made the special order for Thursday, March 11, at ten o'clock A.M.

The Finance Committee then reported as follows:

REPORT OF FINANCE COMMITTEE.

The Finance Committee submit the following:

The gross expenses for the year ending March 1, 1869, are as follows:

Board expense	$2,391 [illegible]
Library	809 13
Land scrip	219 [illegible]
Salaries	13,000 00
Chemical apparatus	978 00
Engineering instruments	349 45
Philosophical apparatus	304 [illegible]
Fuel, lights, repairs and incidental expenses	3,173 04
Improvements and alterations in buildings and grounds	6,[illegible] 13
Farm and garden, including purchases of teams, wagons, implements, fencing, building of barn, and running expense	7,[illegible] 25
Total	$36,[illegible] 03

Receipts for the year ending March 9, 1869, were as follows:

Interest on Champaign county bonds	$10,0[illegible] [illegible]
Interest on Illinois bonds	6,985 [illegible]
Interest on Sangamon county bonds	2,[illegible] [illegible]
Interest on Chicago water bonds	1,7[illegible] [illegible]
J. M. Gregory, for freight	640 [illegible]
Rent of farm lands	465 75
Tuition and other fees	2,[illegible] 00
Sales of produce of farm	941 [illegible]
M. C. Goltra, refunded on land scrip	1,185 10
E. M. Eppstein, for University buttons	65 55
	$27,500 [illegible]
Amount on hand, March 9, 1868	10,178 10
Total	$37,678 [illegible]
Less disbursements	36,[illegible] [illegible]
Leaving balance in hands of Treasurer, after paying warrants now outstanding	$979 [illegible]

At our November meeting, the Treasurer and Finance Committee were thorized to sell 50,000 acres of land scrip at ninety-five cents. As yet we ve not been able to effect a sale, and would suggest that the limit be noved, and authority to sell without limit be granted.

The location of the 25,000 acres of scrip will probably be attended to at early a date as possible the coming spring and summer, by the Treasurer d Mr. Goltra, in whose hands it was put at our November meeting.

The sale of lands already located should receive attention as soon as prac- able; and with a view of furthering the same, the Treasurer was author- d, at our November meeting, to procure books, classifying said lands, with h other information as could be obtained in relation to them.

The interest-bearing securities in the hands of the Treasurer remain the ne as at our November meeting. The Treasurer and the Chairman of the nance Committee are doing their utmost to obtain county bonds (issued for ier than railroad purposes) bearing a rate of interest at least eight per it., into which we may convert most or all our Illinois bonds, bearing six r cent.

The estimates of expenditures for the coming year will have to be made er the Board, through the various committees, have signified their wishes regard to improvements, etc.

In regard to our expected appropriation from the State, we would recom- nd that the Board, before its adjournment, should signify its wishes as to expenditure of the same, as much in detail as possible, and would recom- nd that it should be put in substantial improvements, economically as may and strictly for the purposes appropriated.

Respectfully submitted.

EMORY COBB,
H. C. BURCHARD.

On motion, the report was accepted and approved.

It was moved that the report of the Regent be taken up in ail, and allotted to the appropriate committees.

On motion, the first or introductory portion was referred to Committee on Faculty and Course of Study; so much as ates to the farm, to the Committee on Agriculture; so much as ates to buildings and grounds, to the Committee on Buildings l Grounds; so much as relates to Horticulture, to the respective nmittee; so much as relates to Library and Cabinets, to the nmittee on same; so much as refers to the Mechanical Depart- nt, to the committee on this department; so much as relates to nances, referred to the Committee on Finances; so much as ates to warrants drawn, to the Auditing Committee; so much relates to honorary scholarship, to the Committee on Faculty

and Course of Study; so much as relates to newspapers and scurrilous reports, be referred to a Special Committee, consisting of Messrs. Pearson, Lawrence and Blackburn.

On motion, the Board took a recess until 7 o'clock P. M.

SECOND DAY—EVENING—7 O'CLOCK.

Board was called to order at 7:30 P. M. Regent in the chair.

The roll being called, the following gentlemen answered to their names:

Allen, Blackburn, Brown of Pulaski, Burchard, Burroughs, Cobb, Dunlap, Edwards, Pearson, Galusha, Gotra, Griggs, Lawrence, Mahan, Kile, Pickrell, Pullen, Wright, Van Osdel, the Regent—20.

Report of Finance Committee in relation to accounts, was then received and adopted.

REPORT OF COMMITTEE.

Your committee to whom was referred the resolution in regard to the appointment of a book-keeper, with instructions to examine the books of account of the University, would respectfully report that they have considered the resolution in regard to the appointment of a book-keeper, and while they find the latter correctly kept, yet they deem it advisable that fuller accounts and entrees should be made so that the books will show, at all times, the monetary transactions, and exact financial condition of the University, and that accounts should be opened so as to exhibit the receipts and expenditures in each department as well as the general expenditures and the amount of debit or credit of every fund or appropriation.

Your committee would, therefore, recommend the passage of the following resolution:

Resovled, That the Finance Committee be instructed to employ a competent accountant, and to see that a set of books be opened in double entry, in which shall be represented the entire business of the University, including distinct accounts of the leading sources of income and expenditures; and the said accountant to present a proper balance sheet at each annual meeting of the Board, and oftener, if required; and said books to be open at all times to the inspection of the Trustees and Officers of the University; and said accountant shall be subject to the call of the Regent or Recording Secretary for any clerical services they may require.

Carried.

On motion of Mr. Van Osdel, a committee of three, Messrs. Dunlap, Purchard and Cobb were appointed to examine the books for errors, if any there be.

The Auditing Committee made a report as follows:

REPORT OF AUDITING COMMITTEE.

The Auditing Committee to whom was referred the Treasurer's Report, beg leave to report that they have examined the same, with the vouchers accompanying, and find that the accounts have been kept correctly, and show that warrants numbered from 1 to 412, inclusive, have been paid except No. 118 for $179, and No. 403 for $166 66, amounting to $345 66, leaving a balance now in the Treasurer's hands of $1324 59.

The committee recommend that the report be accepted, and that they have canceled the warrants from No. 279 to No. 412, inclusive, except No. 403, by putting a notch in lower side of the same.

They have examined the following bills and recommend that warrants be ordered for the payment of the same, viz:

Doty & Mitchel	$50 00.
Walker Brothers	9 37.
O. L. Barber	25 00
J. A. Hutchinson	16 00.
Mowlding & Harland	66 00.
W. S. Maxwell	2 00.
William Price	27 30.
Dodson & Hodges	81 58.

Respectfully submitted.

L. W. LAWRENCE,
JOHN M. PEARSON,
O. B. GALUSHA,
M. L. DUNLAP,
Auditing Committee.

On motion, the report was adopted.

The following resolution was offered by Mr. Edwards:

Resolved, That female students be admitted to recitations and class lectures on the same terms as to qualification and charges for tuition as male students. But in no case are they to have rooms in the institution; and shall be under such rules and regulations as the Faculty shall from time to time prescribe, until otherwise ordered by the Board.

On motion, it was postponed until Thursday, 11 o'clock A. M.

The Special Committee to whom was referred that portion of the Regent's report relating to newspaper criticisms, reported that the same should be expunged from the records, together with the report relating thereto.

The report of the Committee on Buildings and Grounds was read. (See *report, page*—.)

After discussion, on motion of Mr. BURROUGHS, it was voted that this report and all other reports which may be made calling for appropriations, be referred to the Committee on Finance, with instruction to report to the Board a schedule of all the appropriations asked for.

The report of the Horticultural Committee was read, and on motion recommitted to be reported Thursday.

Report of the Committee on Mechanical Department was referred to Finance Committee.

Report of the Committee on Agriculture was read and adopted.

REPORT.

The Committee on Agriculture beg leave to report that they have had the resignation of Mr. PERIAM under consideration, and would recommend that it be accepted. We have also partially examined his accounts and vouchers, and have no hesitation in saying that we believe them correct. We also find that there is an item charged against the farm of team labor performed at the grounds of the University building amounting to $831 75; also an average of three months time of the Superintendent was spent on the grounds of the building, which would make an amount of $375. These two items we would respectfully ask may be placed to the credit of the farm and charged to their proper accounts.

We have had under consideration that portion of the Regent's report accompanied with plans for the future rotation of crops, etc. We would say that we fully concur in said reports and recommendations, except so much of it that requires the Professor of Agriculture to submit the management of the farm to the Regent and Faculty for their approval. We would respectfully ask that instead of the Faculty, the Committee of Agriculture be substituted, and that only so much of the plans of the Professor of Agriculture as may relate to the classes shall be submitted to the Faculty.

We would also recommend that the Professor of Agriculture be empowered to employ such help as he may deem necessary, and keep separate and correct accounts of the farm and his acts and doings, to manage the farm known as the Experimental and the Busey Farm.

The Griggs Farm, we understand, has been satisfactorily rented for the next year. We would respectfully ask that the Professor of Agriculture be authorized to have an accurate survey of the Busey Farm made, in order that the hedges may be set in the proper place. We would further recommend that the present crop of produce that will not be needed for the farm should be sold and placed to the credit of the Farm account.

All of which is respectfully submitted.

J. H. PICKRELL,
WILLIAM KILE,
A. BLACKBURN,
LEMUEL ALLEN.

Mr. PEARSON moved that the recommendations of Prof. Stuart in relation to needed apparatus and chemicals, and the method of using and disbursing the same, be referred to Committee on Mechanical Department.

Carried.

Report of Military Department was then read, and, on motion, recommitted, to be reported Thursday, March 11, 10 A. M.

Mr. EDWARDS introduced the following resolution:

WHEREAS the Board of Trustees contains too many members, incurring too much expense, therefore

Resolved, That the Board suggest to the General Assembly the propriety of so amending the law in regard to the number of Trustees, that the Board shall hereafter consist of one member from each Congressional District and the present members *ex-officio*, a majority of whom shall form a quorum.

Resolved, That the Recording Secretary transmit a copy of these resolutions to the Governor.

On motion it was laid on the table.

Mr. BROWN offered the following resolution:

Resolved, That fourteen feet in width along the west side of the forty acre tract be conceded to the public, for the purpose of widening the avenue along the line.

It was moved that the resolution lie on the table. Lost—yeas 9, nays 12.

On motion, the whole matter was recommitted to the Committee on Buildings and Grounds.

The following motion was offered by Mr. PICKRELL:

I move that tuition be free for the Departments of Agriculture and Mechanic Science and Engineering, and that five dollars per term be charged for the other scientific and classical studies; that twelve dollars be charged for the use of chemicals and apparatus in the Department of Analytical Chemistry, and that two and a half dollars per term be charged to all students for incidental expenses, provided that students holding honorary scholarships shall be exempt from incidental expense.

After discussion, Mr. PICKRELL offered the following:

Moved, that the question of tuition be reconsidered, so far as may apply to the next calendar year.

On motion, they were referred to the Finance Committee.

Mr. BLACKBURN offered the following resolution:

Resolved, That the two lots referred to in the Regent's report, purchased by him and offered the University at cost, be accepted, and he be directed to draw upon the Treasurer for the amount required for this purchase and the proper conveyance of said lots to the University.

On motion, it was referred to the Finance Committee.

The Special Committee, to whom was referred the bill of Mr. Dunlap, made the following report:

Your Committee, to whom was referred the bill of Mr. Dunlap for trees and shrubbery furnished the University, would report, that whilst in many localities the prices of many of the articles would be considered too high, yet, owing to the scarcity or impossibility of obtaining the larger sizes of trees and plants, either here or at any point near by, at lower figures, also from the fact that such plants are much more valuable if obtained near home, under the circumstances we recommend the allowance of the bill as before us. The amount of the bill is $1,547, and now due $453.

SAMUEL EDWARDS,
JOHN M. PEARSON,
B. PULLEN.

The report was recommitted to the Committee for further consideration.

On motion of Mr. COBB, it was resolved that the balance of trees be received by the Horticultural Committee.

On motion of Mr. BROWN, the name of Mr. Griggs was added to the Committee on Course of Study, in place of Mr. Pickard.

The Board thereupon adjourned to Thursday, March 11th, at 9 o'clock, A. M.

THURSDAY, MARCH 11, 1869—10, A. M.

Board called to order at 10 o'clock, A. M. Reading of the Scriptures and prayer by Mr. BLACKBURN. Upon calling the roll, the following gentlemen answered to their names: Allen, Blackburn, Brown of Pulaski, Burchard, Burroughs, Cobb, Dunlap, Edwards, Pearson, Galusha, Goltra, Griggs, Kile, Lawrence, Mahan, Pickrell, Pullen, Slade, Wright, Van Osdel, the Regent—21.

The previous minutes of the present meeting were read, and adopted as amended.

The special order for the election of officers was brought up. The REGENT called Mr. Allen to the chair.

Mr. LAWRENCE moved that Mr. Burchard administer the oath to such members as had not already been qualified.

The oath of office was duly administered to Mr. Slade.

Mr. EDWARDS moved that all persons, except reporters for the press, be requested to retire during the election of officers.

After discussion, the motion was withdrawn.

Mr. MAHAN moved that all persons not members of this Board be requested to withdraw.

It was moved that this motion lie on the table.

Carried.

Mr. COBB moved that tellers be appointed.

Carried.

The CHAIR so appointed Messrs. Cobb and Goltra.

Mr. EDWARDS nominated Jonathan B. Turner for Regent of the Illinois Industrial University.

Judge BROWN nominated Dr. J. M. Gregory for re-election as Regent.

On motion, the Board proceeded to ballot for Regent. It was moved that the roll be called, and that members come forward and deposit their ballots.

Upon the roll-call, twenty came forward—Messrs Allen, Blackburn, Brown of Pulaski, Burchard, Burroughs, Cobb, Dunlap, Edwards, Pearson, Galusha, Goltra, Griggs, Kile, Lawrence, Mahan, Pickrell, Pullen, Slade, Wright, Van Osdel.

The CHAIR announced the vote as follows: J. M. Gregory, 17; J. B. Turner, 2; blank, 1.

The CHAIR thereupon declared Dr. J. M. Gregory elected.

On motion of Mr. BROWN, a committee was appointed to notify Dr. Gregory of his re-election. Messrs. Brown and Pickrell were appointed said committee.

Dr. GREGORY was introduced, and returned thanks in a few eloquent words.

On motion of Mr. BURCHARD, it was voted that the election of officers be proceeded with in their regular order. John W. Bunn was nominated as Treasurer, and, on motion, Emery Cobb was authorized to cast for him the unanimous ballot.

Twenty votes were cast, and Mr. Bunn unanimously elected.

On motion, Mr. FLAGG was elected Corresponding Secretary unanimously, as by the preceding vote.

Prof. W. F. BLISS was unanimously elected Recording Secretary, as by the preceding vote.

The committee to whom was recommitted the consideration of Mr. Dunlap's bill of trees, made their report.

ADDITIONAL REPORT OF SPECIAL COMMITTEE.

Your Committee, to whom was referred the bill of trees and contract of M. L. Dunlap, would respectfully represent that they have given the subject some farthe

attention, upon consultation with Mr. Dunlap have agreed with him and he with them to change the price of Norway Spruce from $2 00 each to $1 75, as follows:

500 Norway Spruce, @ $2 00	$1,000 00
should be, 500 Norway Spruce, @ $1 75	875 00
Making Cr. on said bill of	$125 00

showing balance due University, in stock, of $578.

The Committee also feel that it is due to Mr. Dunlap to say, that in delivery of the balance of the contract he desires the Committee of Selection to take notice of the prices charged at the time, and assures this Committee that if said prices are objectionable he will pay the balance of the contract in cash; we therefore append the following;

Resolved, That said account be amended to correspond with the above statement, and the balance of stock taken from Mr. Dunlap's nurseries as soon as convenient.

SAMUEL EDWARDS,
B PULLEN,
JOHN M. PEARSON,
M. L. DUNLAP.

Mr. BURCHARD moved to amend as follows:

Strike out $1 75 and insert $1 50, which appears by the catalogue furnished by Mr. Dunlap to the Committee to be the lowest catalogue price.

Question on the amendment voted nay. Question on the original motion voted aye. Question on the adoption of the additional report, voted aye.

The report was adopted.

Mr. COBB offered the following:

Moved that the chairman of Committee on Agriculture be added to the Horticultural Committee as agents of this Board to receive the balance of Mr. Dunlap's donation of trees and shrubbery.

Carried.

The report and resolutions of Committee on Horticulture was then received and referred to the Finance Committee.

The Committee on Horticulture, to whom that portion of the Regent's report relating to the Horticultural Department was referred, ask leave to submit the following report:

The impossibility of making a personal inspection of the grounds, prevents the Committee from forming any very intelligent opinion of the merits of the plan recommended for the division of the grounds to be devoted to orchards, gardens, etc. It seems to them that there is no material difference between the plan of the Regent and that recommended in the report of the Committee on Horticulture made to this Board at its last November meeting. They recommend adherance to the plan of that Committee, to be worked out as the means at the disposal of the Board in the future may enable us to do it.

If the Legislature should pass the appropriation expected, we shall have $10,000 available for expenditure the present year and the same amount for the year 1870.

Your Committee recommend the construction of the barn and gardener's house estimated for in the report to which they have referred above, and that there shall be no permanent tree planting except the 3,000 trees purchased from Lawver—an osage hedge around the grounds and the timber belts provided for in the November report.

These belts will require the following trees, to-wit:

330 European Larch.
450 Norway Spruce.
330 White Ash.
165 Silver Maple.
330 Austrian Pine.
165 White Pine.
250 Arbor Vitæ.
210 Green Ash.
165 Red Cedar.
250 Blue Ash.

Of these, the evergreens should be 2½ feet high and the deciduous trees 3 to 6 feet high. The estimated cost of these is $534 60.

The Committee think that for all plantings except those indicated above, small trees should be purchased, as far as the means will allow, and cultivated in nursery for one or more years.

Your Committee recommend the following appropriations, viz:

Trees for timber belts	$600 00
Other trees, nuts, seeds and plants	1,000 00
Orchard, including the two purchased from Lawver	1,000 00
Hedge plants	18 00
Gardener's house	600 00
Barn and out buildings	2,600 00
1 Span horses	300 00
1 Wagon and harness	150 00
Tile draining orchard	2,000 00
Labor one year	1,332 00
	$10,000 00

Your Committee ask the adoption of the following resolutions:

1. *Resolved*, That the plan for dividing and planting the grounds to be devoted to horticulture, devised and recommended by the last November report of this Committee, be adopted, subject to such modifications and amendments in the details as may hereafter, upon the further survey of the grounds, be deemed necessary.

2. *Resolved*, That until a Professor of Horticulture shall be appointed, the execution of the plan indicated above shall be under the general supervision and control of the Professor of Agriculture, who shall have power to make the necessary contract for under-draining the land—to employ competent laborers for planting the orchards, nursery, hedge and timber belts, and to receive and recommend to the Executive Committee plans for the barn, out-buildings and gardener's house, and upon the approval of such plans the said Professor of Agriculture shall proceed to have said buildings erected.

3. *Resolved*, That Samuel Edwards and O. B. Galusha are hereby authorized to purchase the trees, seeds and *nursery stock* estimated for in the foregoing report, of

such kinds and in such proportions as they may agree upon, and the Regent is directed to draw warrants upon the Treasurer for the price of such trees, etc., upon their order.

4. *Resolved*, That the sum of $10,000, to be paid out of the appropriation made by the Legislature, be appropriated for the purpose of carrying the foregoing resolutions into effect, to be expended for the various objects set forth in this report, as far as may be necessary.

5. *Resolved*, That the Professor of Agriculture select and receive, this spring, from the nursery of M. L. Dunlap, stock to the amount of the balance due from him, provided he shall find there such trees and plants as will answer our purposes.

A. M. BROWN, *Chairman*.

After discussion the Committee on Horticulture offered the following substitute to third resolution, contained in their report:

Resolved, That the Professor of Agriculture, advising with the chairman of Committee on Horticulture, be authorized, etc. [See report resolution 3.]

And further recommend to amend the resolution appropriating $10,000 for Horticultural Department by increasing item for gardener's house to $850, and decreasing item for draining to $1,750, and recommended the passage of resolutions, as amended.

Which substitute and amendment were made a part of the report.

On motion the Board adjourned to 2 o'clock P. M.

THIRD DAY—THURSDAY, MARCH 11, 1869.

Board called to order at 2:30 P. M., Dr. KILE in the chair.

Mr. LAWRENCE made report in relation to a bill presented by Dr. WARDER.

Mr. DUNLAP made report for Military Committee on Uniforms, etc.

Mr. GOLTRA moved to strike out blue and insert gray. Motion on adoption of resolution lost.

Moved, that the following addition to rule 4, of the by-laws of this Board [page 86], be adopted.

ADDITION TO RULE 4, PAGE 86 OF FIRST ANNUAL REPORT.

That hereafter no student shall be required to provide himself with a military dress for the first term of his attendance. That there be set apart for the purpose of procuring buttons, and the letters I. I. U., to be enclosed in a suitable metalic wreath for the caps, the sum of fifty dollars, which shall be placed in the hands of the book-keeper, who shall procure a supply of these buttons and letters under the direction of the Faculty, and the said book-keeper shall sell the same at cost to the students or other persons for the purpose herein contemplated, in such lots as they

may need. He shall be charged with the fifty dollars, and have credit for the sums received and buttons on hand. It shall be his duty, out of this fund, to keep a supply of buttons, letters and wreaths on hand to meet the demand.

Resolved, That fifty dollars be appropriated out of the library fund for the purchase of buttons and letters required for the military uniform, to be expended as provided in the resolution adopted by the Board and referred to the Committee.

This addition to rule 4, of the by-laws, was adopted.

The special order of the hour being the resolution of Mr. Edward in relation to admission of female students,

On motion of Mr. Griggs, it was voted to lay it on the table.

Ayes and nays being called for, the vote counted as follows:

Ayes—Messrs. Allen, Brown of Pulaski, Burchard, Burroughs, Cobb, Pearson, Goltra, Griggs, Lawrence, Mahan, Kile, Pullen, Slade, Van Osdel and the Regent—15.

Nays—Messrs. Blackburn, Dunlap, Edwards, Gulusha, Pickrell, Wright—6.

The report of Committee on the Mechanical Department, to whom Prof. Stuart's communication in regard to regulations for the laboratory was referred, was read.

REPORT OF COMMITTEE.

The Committee on Mechanical Department to whom was referred a communication of Prof. Stuart, beg leave to report.

1st. That each student of analytical chemistry shall, before commencing work in the laboratory, deposit with the Treasurer or his representative, a sum of money equal to the average expense, for use of chemicals and wear and depreciation of apparatus in the hand of such student.

2d. That for a course of two hours daily (except Saturdays) during a term of 12 weeks the sum deposited shall be $12—for a course of four hours daily, the sum deposited shall be $24, and for a course of six hours daily, the deposit shall be $36.

3d. That an account shall be kept by the Professor of Chemistry with each student, in which all the items furnished such student shall be recorded, with charges of cost of same; and the account shall be closed the day before the first day of the examinations at the end of the term, when a settlement shall be made.

4th. That a student who shall use the apparatus belonging to the laboratory and who shall wish to return the same at the end of the term, shall be permitted to do so, provided the apparatus be returned in good condition, and provided also a sum equal to 20 per cent. or its value when received be allowed for the use of the same, such per centage not to exceed $3 00 for the term.

5th. Students shall pay the value of the apparatus broken or destroyed by them individually.

6th. A scale of prices shall be established for the chemicals, or reagents used by students, and the prices to be the cost of the same as paid by the University.

7th. All moneys received from students for chemicals and apparatus shall constitute a distinct fund, from which the Professor of Chemistry may draw to purchase supplies *from time to time, as occasion* may require.

8th. That proper regulations may be established for the government of the students, while working in the laboratory. And a penalty may be fixed for the violation of any such rules proportioned to the magnitude of the offence, the penalties not less than five or more than twenty cents for the violation of any one rule so established, and posted in a conspicuous place in the laboratory.

9th. As it will be desirable for the Professor to have chemicals for the analysis of soils, plants, grains, etc., made outside of the regular work of the students, and as there will be much wear and tear, and depreciation of apparatus in general use, not chargeable to the students, and as extensions and additions to the laboratory is contemplated and necessary, therefore

Resolved, That the sum of five hundred dollars be appropriated for the purpose as set forth in the ninth section of this report.

Resolved, That the charges, rules and regulations for students in Analytical Chemistry, as set forth in the above report, be adopted.

JOHN M. VAN OSDEL,
Chairman of Committee on Mechanical Department.

On motion, the ninth resolution was stricken out and the report was then adopted as amended.

Mr. PICKRELL offered the following:

Resolved, That the Committee on By-Laws be instructed to prepare a set of laws and rules for the guidance of the Faculty.

Adopted.

Mr. ALLEN offered the following preamble and resolution:

Mr. Jonathan Periam, our late Head Farmer, having resigned his position in connection with the Board,

Resolved, That we regret the loss of his valuable services and ripe experience at this juncture of our history,

And resolved, That we are gratified to learn of his appointment to a position where he may be eminently useful in developing one of the new Agricultural enterprises of the State.

Carried.

Mr. BLACKBURN offered the following resolution:

Resolved, That the Board embrace the occasion of the re-election of Dr. J. M. Gregory, as Regent of this University, to renew to him their oft-expressed assurances of continued confidence and respect, and to congratulate him on his almost unanimous re-election to the place he has filled for the closing term of two years with so much credit to himself, advantage to our rising institution and the great interests of the laboring and industrial classes, and that we hereby vindicate this institution, its officers and faculty, against the charge of wresting it from its primary and normal design, and from all bitter and unfounded charges made and put in circulation against it.

Mr. DUNLAP moved that it lie on the table.

Lost.

Vote upon the original resolution carried.

Mr. Edwards moved to take the resolution from the table in reference to the number of Trustees.

Ayes and nays being called for, his motion was withdrawn.

The report of the Committee on Faculty and Course of Study was then read:

REPORT.

The Committee on Faculty and Course of Study recommend that—

1st. The labor system to be continued as an important and valuable feature of practical education, and that the maximum rate of wages be fixed at twelve and one-half cents an hour, and that the hours of labor shall not be less than one and not more than three per day for five days each week, the amount to be determined by the Faculty, who may also excuse any student from the labor for cause. [Amended: *Provided*, that all labor shall be voluntary.]

2d. That the hours of labor and the wages of the several students shall be determined monthly, by the Faculty, and paid by the Regent from the funds of the department for which the labor has been performed, provided that the Faculty may impose a forfeiture of wages for willful absence from labor, or for negligence or unfaithfulness at work.

3d. That the labor shall be conducted with a steady aim to the practical education of the students and shall, as far as possible, coincide with and illustrate their several courses and studies.

The committee also recommend:

4th. That whereas the honorary scholarship provided for by the law is restricted to descendants of soldiers or seamen who served in the army or navy of the United States, there shall be offered by the Trustees one free or honorary scholarship to each county in this State, to be awarded to the student who shall pass the best examination for admission, and who shall agree to pursue one of the industrial courses of study.

5th. That graduates of other colleges desiring to pursue any special branch of study here, be received as resident graduates, on the payment of the usual fees except the matriculation.

6th. Whereas, in the early commencement and organization of the work of committees of this Board, it seemed necessary that the Regent of the University should be placed upon said committees and assume responsibilities which properly belong to the heads of other departments, therefore,

Resolved, That the Regent, at his request, be excused from active service on committees, except the Executive Committee and Committee on Faculty and Course of Study, and that each department be held responsible to this Board for the manner in which it shall discharge its duties; the Regent, as the executive officer of this Board, holding the head of each department to a rigid accountability for the same.

Signed, J. M. GREGORY,

Chairman.

Mr. DUNLAP moved to amend by inserting at the end of section one:

"*Provided*, That all labor shall be voluntary."

The report was then adopted with the amendment.

Mr. PICKRELL moved that the State appropriation made for farms of the University, be appropriated, to be expended under the direction of the Professor of Agriculture and the Farm Committee.

Accepted and referred to the Executive Committee.

The report of the Committee on Buildings and Grounds was received and adopted.

REPORT.

Your Committee on Buildings and Grounds, to whom was referred that part of the Regent's report, which relates to repairs and improvement of the University buildings, beg leave to report that a new roof of tin work should be put on the main building the estimated cost of which would be $850.

They also recommend a cast iron water table around the entire main and wing building on the offset in the brick work at the top of the basement stones, cost about $250. Also, the cornices and cupola of main building should be painted; cost, about $75.

Also, that painting of the entire brick wall of the University building would prevent the absorption of moisture and much improve the appearance of the building; the cost of painting the entire walls, $1,000.

They recommend the sidewalk to the Springfield road, about 900 feet on west side of University grounds; cost of sidewalk, $250.

They also recommend the walls of corridors or passages in the University building to be painted five feet high, two coats; cost about $150.

SYNOPSIS.

1.	Roof on main building	$850
2.	Cast iron water table	250
3.	Painting cornices and cupola	75
4.	Painting brick walls	1000
5.	Sidewalk	250
6.	Painting corridors	150
	Total	$2575

M. C. GOLTRA,
Chairman.

Report of Committee on Mechanical Department, was read and adopted:

REPORT.

Your committee, to whom was referred that part of the Regent's report relating to the Mechanical Department, beg leave to report, that suitable draw-

ing tables, drawing boards, T squares, and instruments, should be provided, and instruction given in geometrical drawing applicable to the science of architecture and the mechanic arts, also the application of the theories of mechanical forces and the strength of material, illustrated by models and experiments.

We also recommend the employment of a suitable Professor, to teach the science of Architectural and Mechanical Drawing, before the commencement of the fall term.

We also recommend the enlargement of the workshops by removal of the stalls, so that a larger number of the students may be employed in carpentry and the practical construction of implements and machinery. For the use of the students engaged in this department, we recommend that suitable tools be obtained, provided the cost of such tables, boards, instruments and tools shall not exceed in the aggregate $500.

Respectfully submitted,

JOHN M. VAN OSDEL,
Chairman.

The Committee on Library and Cabinets, reported back as follows:

REPORT.

The Committee on Library and Cabinets, to whom was referred so much of the Regent's report as relates to library and cabinets, and to communications referred to in that connection, report the following resolutions:

1. *Resolved*, That the offer of Professor Burrill, to give six weeks of the summer vacation to making collections in Natural History in this State, be accepted, and that he be authorized to take with him such members of his class as may volunteer to accompany him, not exceeding five.

2. *Resolved*, That he be permitted to organize and conduct such short excursions for this purpose during term time as he and the Faculty may agree upon, provided that the same shall not interfere with the regular work and study of the term.

3. *Resolved*, That there be appropriated for such excursions and summer service the sum of $300, to be expended for two (2) wall tents, eight (8) rubber blankets, ten (10) woolen blankets, one (1) oil burning stove and furniture, taxidermal instruments, nets, boxes, cans, bags, ammunition, paper and other materials needed and to be used in collecting and preserving specimens, and for provisions for the party.

4. *Resolved*, That Professor Burrill be requested also to give such attention to the agricultural, fruit-growing and mechanical interests and enterprises of the sections he may visit, as he shall find practicable, and secure such specimens of seeds, soils, grasses, etc., as may serve to illustrate the Agriculture of the State, and that for this end we heartily recommend him to the favor of the Agriculturist and Manufacturers of the State.

5. *Resolved*, That the sum of $100 is hereby appropriated for the purchase of a set of meteorological instruments, and that the Faculty be instructed to provide at once for taking and recording regular meteorological observations.

6. *Resolved*, That the chairman of the committee on Library and Cabinets, in connection with Prof. Burrill, be a special committee to secure and remove the cabinets due us from Prof. Powell.

7. *Resolved*, That there be appropriated, during this year, out of the State appropriations and other funds,

For Library	$2500 00
For Chemical Laboratory and chemicals	2500 00
For Philosophical and other apparatus	1250 00
For Cabinets and Cases	1250 00
	$7500 00

All of which is respectfully submitted,

J. M. GREGORY,
I. S. MAHAN,
LEMUEL ALLEN,
JAMES P. SLADE.

Dr. KILE moved to strike out the $300 appropriated for botanical excursions.

Ayes and nays being called for, resulted in 3 ayes, 17 nays.

Ayes—Messrs. Blackburn, Pearson and Kile—3.

Nays—Messrs. Allen, Brown of Pulaski, Burchard, Burroughs, Cobb, Dunlap, Edwards, Galusha, Goltra, Griggs, Lawrence, Pickrell, Pullen, Slade, Wright, Van Osdel, the Regent—17.

The report and resolutions were then adopted.

A report was offered proposing certain changes in regard to rules of tuition, which report did not come to the hands of the secretary, but the following substitute was offered:

Resolved, That tuition be free to students who pursue studies exclusively in the Agricultural, Polytechnic and Military Departments, and that the tuition to students in other departments, or who pursue other scientific or classical studies, remain as already fixed by the Board. This provision to take effect at the commencement of the next collegiate year.

The question on the substitute was carried.

The Committee to whom was referred the matter of re-imbursement of Dr. Gregory for moneys expended by him in purchase of two lots for the University, reported back in favor of buying said lots.

The report of Special Committee, in relation to errors on account, was accepted and adopted.

REPORT.

Your Committee, to whom was referred the resolution of Mr. Dunlap, in regard to instructing the Finance Committee in relation to errors in books, beg leave to report that they have had the same under consideration and make the following statement:

We find, on page 117, First Annual Report, an order dated July 10th, 1867, to J. O. Cunningham, for the sum of $7,278 50 for the purchase of lands, and on page 140, Report of Executive Committee.

"Mr. Cobb moved that the Regent and Dr. Scroggs be a Committee to negotiate with McKinley and Burnham for forty acres of land lying between the horse railroad and the 160 acres tract, at a price not exceeding $180 per acre, also to negotiate for the two lots lying between the Springfield road and horse railroad, also to obtain offers for the Griggs' farm or some part thereof, and report at the next meeting of the Executive Committee.

Motion carried."

We are unable to find any further record on the subject.

We are satisfied that said warrant was paid for the land and lots, as stated in the motion of Mr. Cobb, and we have no doubt that the error is in the printed record of the Executive Committee; therefore

Resolved, That said report be so amended as to show that the purchase of said land was made on the authority of the Committee by said J. O. Cunningham, and that the said warrant was duly drawn for that purpose.

M. C. Dunlap,
H. C. Burchard,
E. Cobb.

Mr. Dunlap moved that Professors T. J. Burrill and S. W. Shattuck be paid $1,500 per annum, from March 1st, 1869.

Carried.

An additional report of the Committee on Faculty and Course of Study was then submitted:

REPORT.

The Committee on Faculty and Course of Study further recommend that the suggestions of the Regent in respect to an increase of the Faculty be concurred in.

Also, that Prof. W. F. Bliss be re-appointed to the chair of Agriculture.

Carried.

On motion of Mr. Burchard, it was

Resolved, That the Corresponding Secretary be allowed the sum of two hundred ($200) dollars for services during the past year, and a warrant drawn in his favor for that sum.

On motion, it was voted that the Committee on By-laws be instructed to report to the next meeting of the Board an amendment to the by-law relating to the number requisite to change the by-laws; also, to that relating to the payment of Professors' salaries, substituting monthly instead of quarterly, and that, in the meantime, the Regent be authorized to draw warrants for the payments of Professors' salaries monthly.

On motion of Mr. BURCHARD, it was

Resolved, That the Treasurer be allowed for salary, during the past year, the sum of five hundred dollars ($500), and a warrant drawn in his favor for that amount.

Mr. GALUSHA introduced the following resolution:

Resolved, That the Committee on Faculty and Course of Study be and they are hereby instructed so to re-arrange the course of study to be pursued in this institution that they shall consist of,

1. A course in Agriculture, having branch courses in Animal Husbandry, in Horticulture and Gardening.
2. A course in Mechanics, which shall be so varied as to embrace instruction in those branches of study which are relating to the leading mechanic arts.
3. They shall provide for the instruction of students in Military Tactics.
4. They shall provide for teaching of such other scientific and classical studies as are legitimate and desirable in an industrial institution, provided any five or more students in the University shall wish to pursue them.

On motion of Mr. GRIGGS, it was referred to Committee on Faculty and Course of Study.

The Auditing Committee then made the following additional report:

Bill of Wall's Colliery Coal Mining Company, Feb. 18th, March 10th, for two cars coal, $40; to be paid by a warrant in the usual form.

Which was adopted.

On motion of Dr. GREGORY, a special committee of three on the Chemical Department was appointed.

The committee consisted of Messrs. Griggs, Cunningham, Dunlap.

The Committee on regulations for the University reported as follows:

REGULATIONS OF THE UNIVERSITY.

§ 1. The government of the Illinois Industrial University shall be and is hereby committed to the Regent and Faculty, who shall, as soon as possible, prepare a system of rules for the proper government of the students, and maintenance of order in the University, and, from time to time, such additional rules as may be found necessary, and shall submit the same for approval to this Board or the Executive Committee; but such rules shall be in force on the authority of the Faculty until they can be approved by the Trustees.

§ 2. The Faculty shall meet statedly at such times as they shall appoint for the transaction of business pertaining to the management of the internal affairs of the University; and all questions coming before such meetings shall

be determined by the votes of a majority of the members, with the concurrence of the Regent.

§ 3. It shall be the duty of the Regent, as the executive officer of the University, to enforce the regulations of Trustees and Faculty for the maintenance of discipline and order, and to this end, the students of the University shall be subject to his authority, and when the Faculty is not in session, shall be liable to be called to account by him for any violation of rules or orders, to be suspended or otherwise punished at his discretions; but all such acts of the Regent shall be in force only until the next meeting of the Faculty, to which they shall be submitted for final action.

§ 4. Each Professor shall have authority to control students in his own class-room, and at his discretion to suspend or otherwise punish students for any violations of the order of his class, until the next meeting of the Faculty. It shall also be the duty of each Professor to exercise his personal authority at all times to maintain order among the students of the University, and promptly to report to the Regent cases requiring special discipline.

§ 5. Each Professor in charge of a department of instruction in this University shall be held responsible to the Board of Trustees for the faithful and efficient carrying out of the requirements of his department, the adoption of the best methods of instruction and government, and the best text-books and apparatus. He is also charged with the duty of procuring, on consultation with the Regent, and within the limits of the appropriations made for the purpose, the necessary instruments and materials of illustration for his department, and the proper care and preservation of the same. All purchases thus made shall, before put in use, be reported to the book-keeper, and be entered in the inventory of stock, with their cost, and also in the account with the department to which they belong.

§ 6. The Regent shall have general supervision over all the departments of instruction, and shall carefully examine the manner in which each is conducted, consult freely with the Professors in charge, and report to this Board the condition and wants of each.

§ 7. In case of the absence of the Regent of the University, a member of the Faculty, to be, from time to time, designated by the Trustees on the nomination of the Regent, shall act in his place as presiding officer for the administration of the affairs of the University.

The regulations were adopted.

The following resolution, offered by Mr. Pickrell, was voted:

Resolved, That this Board tender their thanks to the publishers of the Champaign County Gazette, for papers furnished at this meeting.

Dr. Gregory offered the following resolution, which was adopted:

Resolved, That the thanks of this Board be tendered to the several parties that have made valuable donations to the University.

On motion of Judge Brown, it was voted that Mr. Thomas Franks be and is *hereby appointed* Gardener to the University, *and that his salary be fixed at* $75 per month.

On motion of Mr. ALLEN, it was

Resolved, That the thanks of this Board be tendered to the Agricultural and Daily Press for the reports of the proceedings of the meeting of this Board.

The report of the Finance Committee was then read and received:

REPORT.

Your Committee on Finances would ask the Board to make the following appropriations for the current expenses of the year, and that warrants may be drawn to meet the same.

APPROPRIATIONS FOR THE CURRENT YEAR.

1.	University Building	$2,575
2.	Mechanical Department	500
3.	Military Department (purchase of buttons)	50
4.	Agricultural Department	3,000
5.	Purchase of two lots	425
6.	Treasurer and Corresponding Secretary's salary	700
7.	Taxes on lands	1,200
8.	Board Meetings	1,000
9.	Salaries	21,544
10.	Students' Labor	1,500
11.	Fuel and lights	500
12.	Cabinets (Geological and Botanical Excursion)	300
13.	Meteorological Instruments	100
14.	Stationery and Printing	150
15.	University grounds	1,000
16.	Incidental Expenses	1,500
	Total	$36,044

The receipts for the next year are estimated as follows:

Balance on hand	$9000
Interest on Champaign county bonds	10,000
" Morgan " "	2,500
" Sangamon " "	4,500
" Illinois 6 per cent. "	6,540
" Chicago Water "	1,750
Farm produce on hand to be sold	1,500
Probable receipts from matriculation and other fees	1,800
Proceeds of Farm for one year	3,000
Rent of lands	1,500
Total receipts	$33,990

This we respectfully submit as the estimate of receipts and expenditures for the next year, and recommend the adoption of the following:

Resolved, That the Regent be authorized to draw warrants, from time to time, to meet the expenditures for the above objects, not to exceed the amount hereby appropriated for each.

J. H. Pickrell,
C. R. Griggs,
E. Cobb,
H. C. Burchard.

On motion, the report was adopted.

The Auditing Committee then submitted the following report:

REPORT.

The Auditing Committee beg leave to further report, that they have examined the following bills, find them correct, and recommend that the Regent be ordered to draw warrants for their payment:

Trevett & Green, hardware	$15 67
J. V. Peterson, stationery	20 90
A. P. S. Stuart, chemicals	23 81
J. M. Gregory, petty expenses	73 72
C. G. Larned & Co., stoves and repairs	71 90

The bill of Dr. Warder your committee report back, with the recommendation that it be referred to the Executive Committee.

We also recommend the adoption of the following resolution:

Resolved, That all parties dealing with the University be instructed to make no bill against the same; but upon a written order from the proper person, which order shall be presented with the bills as vouchers therefore.

L. W. Lawrence,
Jno. M. Pearson,
M. L. Dunlap,
O. B. Galusha.

The report and resolution were, on motion, adopted.

On motion of Judge Brown, the Treasurer and Chairman of Finance Committee, were authorized to convert Champaign county bonds to meet any deficiency reported by the Finance Committee, or such deficiencies as may occur.

Carried.

Moved and seconded, that the Board stand adjourned.

Carried.

J. M. GREGORY,
Chairman.

Jonathan Periam,
Recording Secretary.

The following " Statement of Warrants drawn by the Regent" should have appeared after the Regent's Report, on page 70, but did not reach the printer in time.

Statement of Warrants drawn by the Regent.

No.	To whom.	Date.	Object.	Amount.
		1868.		
1	O. B. Galusha	March 12..	Services as Recording Secretary	$325 00
2	Thos. Quick	" 12..	Expense to Board meeting	24 55
3	B. Pullen	" 12..	" "	18 40
4	I. S. Mahan	" 12..	" "	20 15
5	O. B. Galusha	" 12..	" "	26 10
6	L. R. McMurry	" 12..	" "	12 50
7	W. C. Flagg	" 12..	Salary as Corresponding Secretary	100 00
8	W. C. Flagg	" 12..	Expenses as Corresponding Secretary	20 80
9	Thos. Quick	" 12..	1 span of horses	354 00
10	G. W. Atherton	" 14..	Salary, February	166 67
11	H. C. Stewart	" 16..	1 span horses	300 [illegible]
12	Lemuel Allen	" 16..	Expenses to Board meeting	22 40
13	J. H. Pickrell	" 16..	" "	12 10
14	A. Blackburn	" 16..	" "	27 20
15	J. S. Johnson	" 16..	" "	44 00
16	J. C. Burroughs	" 16..	" "	34 00
17	A. B. McConnell	" 16..	" "	15 25
18	Emory Cobb	" 16..	" "	49 30
19	E. Cobb	" 16..		107 50
20	J. W. Bunn	" 18..	Services as Treasurer	600 00
21	W. S. Hall & Co	" 18..	Blank books and Stationery	56 02
22	J. M. Gregory	" 18..	Balance of Library expenses	18 67
23	Jos. McCorkle	" 19..	Hardware	20 21
24	Flynn & Scroggs	" 19..	Printing and advertising	48 50
25	Jonathan Periam	" 19..	Harness and farm expenses	127 10
26	G. K. Hosford	" 19..	Spittoons and lamps	6 85
27	Dodson & Hodges	" 19..	Hardware	79 29
28	F. Porter Thayer & Co	" 19..	15 doz. chairs	136 00
29	C. G. Larned & Co	" 19..	Stoves and pipes	63 00
30	W. C. Flagg	" 19..	Expense to Board meeting	21 45
31	Fuller, Warrant & Co	" 19..	1 cook stove, etc	110 50
32	L. C. Garwood	" 21..	1 eight day clock	36 00
33	S. F. Percival	" 24 .	5 tons hay	35 00
33½	Walker Bros	" 24..	Lumber and tables	218 32
34	Palmer, Fuller & Co	" 24..	20 hot-bed sash	74 50
35	Hubbard & Herrick	" 24..	Hardware	12 40
36	Prairie Farmer Company	" 24..	Circulars and advertising	107 25
37	J. W. Scroggs	" 24..	Service as Secretary Executive Committee	15 00
38	Hibbard & Finch	" 26..	1 wagon, 5 bush. wheat, 8 bags, 2 collars	126 05
39	C. H. Dolton	" 28..	Seed potatoes	25 10
40	Hovey & Nichols	" 28..	Grass seed and peas	59 91
41	Hamar & Green	" 30..	Hardware	120 92
42	C. Scribner & Co	" 30..	Maps and globe	135 65
43	Jackson Burt	" 30..	5 bush. seed wheat	12 50
44	M. L. Dunlap	" 31..	Expense at Board meetings	7 50
45	G. L. Hessell	" 31..	Harness	67 10
46	F. D. Reaford	" 31..	24 bush. potatoes	32 40
47	W. A. Baker	April 3..	Salary for March	166 67
48	Jonathan Periam	" 4..	Salary for 1st quarter	375 00
49	Jonathan Periam	" 4..	Board of men and seeds	60 00
50	Robert Rolston	" 4..	3 months' work on farm	60 00
51	Fred. Finder	" 4.	" "	60 00
52	N. J. Swayze	" 4..	Plan for portico	20 00
53	G. W. Atherton	" 8..	Salary for March	166 67
54	J. M. Gregory	" 14..	" "	333 33
55	Elisha Eldred	" 14..	10,000 feet fencing	190 00
56	M. C. Goltra	" 28..	Locating land scrip	200 00
57	M. C. Goltra	" 28..	Expense at Board meeting	17 05
58	A. M. Griswold	" 29..	1 post augur	4 00
59	Cormish & Cook	" 29..	3 horse whiffletrees, etc	19 00
60	J. Riehl	" 29..	10 bush. seed oats	7 80
61	James Braddock	" 29..	1 month's work on farm	20 00
62	Geo. Limberger	" 29..	3 horses, 1 wagon, 1 harness	400 00
63	H. N. F. Lewis	" 29..	Advertising in Western Rural	80 00
64	Aaron Potter	" 29..	Services as clerk and librarian	100 00

Statement—Continued.

No.	To whom.	Date.	Object.	Amount
		1868.		
65	G. H. Anderson	May 1	Interest on warrant 64, of 1867	[illegible] ..
66	W. A. Baker	" 1	Salary for April	166 66
67	J. S. Searfoss	" 2	Wages for April	[illegible]
68	H. Dunlap	" 4	5000 strawberry plants	25 ..
69	J. W. Bartman	" 5	1 load of wood	2 75
70	Fuller, Finch & Fuller	" 5	1 barrel linseed oil	40 [illegible]
71	J. M. Gregory	" 5	Pay-roll of students' labor	125 ..
72	Beidler & Kratz	" 12	Lumber	180 72
73	Thomas Quick	" 12	Expense of Executive Committee meeting	16 80
74	L. S. Mahan	" 12	Expense of Executive Committee meeting	18 10
75	J. S. Johnson	" 12	Expense of Executive Committee meeting	25 ..
76	M. C. Goltra	" 12	Expense of Executive Committee meeting	17 ..
77	J. M. Gregory	" 13	University buttons for uniforms	60 75
78	Hall & Peterson	" 13	Books and stationery	10 80
79	Dodson & Hodges	" 13	Hardware	147 58
80	Sam Houston	" 13	Two days' teaming	8 ..
81	J. Periam	" 13	Farm expenses	146 15
82	J. M. Davies	" 13	Stones and labor	21 70
83	Flynn & Scroggs	" 13	Printing blanks	57 ..
84	J. M. Scroggs	" 13	Salary as Superintendent	151 [illegible]
85	A. H. Andrews & Co	" 13	Anatomical plates	30 ..
86	C. G. Larned & Co	" 14	Stoves and pipe	66 ..
87	Adams, Blackmer & Lyon	" 14	1 history chart	6 ..
88	Aaron Potter	" 14	Meals furnished Trustees	10 70
89	Wm. Price	" 14	Paints and painting	418 25
90	Park & Royer	" 14	212 feet posts	7 [illegible]
91	Beidler & Kratz	" 14	Lumber account	33 17
92	Hulburd, Herrick & Co	" 14	60 brass keys	8 12
93	J. M. Gregory	" 14	Pay-roll of students' labor	101 12
94	Patrick Lamb	" 14	Wages of Janitor—1 month	37 ..
95	G. W. Atherton	" 16	Salary for April	166 66
96	J. M. Gregory	" 16	" "	333 34
97	J. A. Hutchinson	" 18	Services of jack	10 ..
98	D. J. Ayres	" 18	9 1-4 days work, carpentering	25 44
99	Elisha Eldred	" 23	Lumber for barn, shop and fence	545 87
100	Chas. Sherman	" 30	6 days' work, carpentering	16 [illegible]
101	D. G. Ayres	" 30	11 days' work, carpentering	30 25
102	J. W. Powell	" 30	Salary	600 ..
103	Hanson Henry	June 1	2 months, 18 days' work	40 [illegible]
104	John S. Davis	" 1	1 month's work	25 ..
105	J. M. Gregory	" 1	Salary for May	333 33
106	A. M. Cheny	" 1	1 day's work, carpentering	2 75
107	W. A. Baker	" 1	Salary for May	166 66
108	S. P. Percival	" 2	Hay and osage orange plants	17 10
109	Fuller, Finch & Fuller	" 2	Glass and white lead	44 18
110	J. S. Searfoss	" 2	Wages for May	[illegible]
111	Robert Rolston	" 3	2 months' farm work	40 ..
112	Walker, Lapham & Co.	" 3	Lumber and work	32 24
113	J. O. Cunningham	" 3	Expense for labor and insurance	179 ..
114	Robert Peacock	" 3	Bill of lumber	[illegible]
115	S. M. Dunsett	" 4	1½ days plastering	6 ..
116	N. Bateman	" 5	Postage on circulars	14 80
117	G. W. Atherton	" 10	Salary for May	166 66
118	J. M. Gregory	" 11	Pay-roll of students' labor	150 ..
119	Thos. Quick	" 12	Expenses at Board meeting	13 30
120	L. S. Mahan	" 12	" "	18 05
121	B. Pullen	" 12	" "	15 [illegible]
122	E. W. Holmes	" 13	Board for farm hands	120 ..
123	Aaron Potter	" 15	Services as librarian and clerk	40 [illegible]
124	T. J. Burrill	" 15	Teaching 1-6 of academic year	200 ..
125	F. A. Avey	" 15	Blacksmithing	14 15
126	Elisha Eldred	" 15	Lumber	154 18
127	Angle, Sabin & Co	" 15	Plows	38 50
128	Patrick Lamb	" 15	Wages as Janitor, 1 month	37 ..
129	D. G. Ayres	" 20	12½ days' work, carpentering	35 06
130	J. Periam	" 23	Boarding farm hands	56 ..
131	Chas. E. Allard	" 23	1 week's wages, farm work	4 75
132	Aaron Potter	" 23	1 week's boarding, farm hand	3 [illegible]
133	C. D. Gregory	" 27	Services as accountant	15 ..
134	J. M. Gregory	" 27	Salary for June	[illegible]
135	J. L. Davis	" [illegible]	1 month's wages, farm work	[illegible]

Statement—Continued.

No.	To whom.	Date.	Object.	Amount.
		1868.		
136	James Braddock	June 29	2 months' farm work	$40 ..
137	Gammon & Prindle	" 29	1 horse rake	27 ..
138	S. H. Busey	" 30	1 stack hay, for teams	25 ..
139	Hubbard, Herrick & Co.	" 30	Locks for University	10 75
140	J. N. Wharton	July 4	9¾ days' work carpentering	14 63
141	A. L. Rader	" 4	14 days' work on farm	21 ..
142	Albert Russell	" 4	1½ days' work on farm	2 25
143	Pat. Sullivan	" 5	1 month's work on farm	30 ..
144	Pat. Lynch	" 5	" "	30 ..
145	Fritz Finder	" 5	3 months' work on farm	60 ..
146	Geo. Lauberger	" 5	2 months' work on farm	40 ..
147	Jonathan Periam	" 5	Salary for 2d quarter	375 ..
148	W. A. Baker	" 5	Salary for June	166 67
149	G. W. Atherton	" 5	"	166 67
150	W. H. Crayne	" 5	14¾ days' work on shop	28 13
151	J. S. Searfoss	" 5	Wages for June	80 33
152	J. E. Graham	" 5	10¾ days' work on barn	16 13
153	D. G. Ayres	" 5	5 days' work carpentering	13 75
154	I. C. R. R. Co	" 6	Advanced freight	7 35
155	Fairbanks & Greenleaf	" 10	1 hay scale	100 ..
156	Thomas Franks	" 15	1 month's work, gardener	40 ..
157	Pat. Lamb	" 17	21 days' work on farm	30 ..
158	J. S. Davis	" 18	18 days' work on farm	20 90
159	J. M. Gregory	" 18	Bill of Ritchie & Son for philosophical apparatus	504 50
160	Fuller, Finch & Fuller	" 18	1 barrel linseed oil	40 85
161	J. E. Graham	" 24	15 days' work carpentering	22 50
162	W. H. Crayne	" 24	9 days' work carpentering	13 50
163	J. M. Gregory	" 25	Salary for July	333 33
164	D. G. Ayres	" 27	14½ days' work carpentering	39 19
165	G. W. Holmes	" 30	Boarding farm hands	28 63
166	G. W. Atherton	Aug. 1	Salary for July	166 66
167	Wm. A. Baker	" 1	"	166 66
168	Trevett & Rupert	" 1	Hardware	51 71
169	S. J Searfoss	" 6	Wages for July	83 33
170	Champaign Union Gazette	" 6	Printing and advertising	12 50
171	D. G. Ayres	" 7	6 days' work carpentering	16 50
172	Jonathan Periam	" 10	Farm expenses	272 50
173	½] James Lynch	" 10	1 month's wages on farm	35 ..
173	John Kinney	" 10	" "	35 ..
174	Hamar & Green	" 11	Hardware	13 83
175	J. M. Gregory	" 11	Salary for August	333 33
176	Journal Company	" 14	Advertising and printing	168 75
177	Dodson & Hodges	" 14	Tinning roof	609 91
178	Patrick Lamb	" 25	1 month's wages, Janitor	37 ..
179	Thos. Franks	" 25	1 month's work, less 1½ days	36 15
180	F. M. & A. Avey	" 25	Blacksmithing	24 ..
181	American Express Company	" 25	Expense on books from Washington	9 80
182	Geo, W. Holmes	" 26	Boarding farm hands	68 ..
183	James Braddock	" 26	2 months' farm work	40 ..
184	Pat. Lynch	" 31	1 month's farm work	20 ..
185	James Lynch	" 31	Labor on farm	29 35
186	Geo. W. Atherton	" 31	Salary for August	166 67
187	Wm. A. Baker	" 31	"	166 67
188	Wm. P. Sweet	Sept. 4	Lightning rods	41 15
189	J. S. Searfoss	" 4	Wages for August	88 34
190	Bord & Chandler	" 5	Engraving of college	35 30
191	Hovey & Nichols	" 5	Garden shears and border cutter	9 ..
192	Geo. Landberger	" 7	2 months' farm work	40 ..
193	Elisha Eldrid	" 8	195 feet moulding	6 34
194	Fritz Finder	" 9	2 months' farm work	40 ..
195	John Kinney	" 12	1⅓ months' farm work	46 66
195	½] A. L. Rader	" 14	3¾ days' work on grounds	5 63
196	Mrs. Mary Coffey	" 15	4 7-10 days' cleaning	7 05
197	Thomas Franks	" 15	1 month's wages	40 ..
198	B. Pullen	" 16	Expenses at Board meeting	19 70
199	I. S. Mahan	" 16	" "	20 45
200	Thomas Quick	" 16	" "	27 65
201	J. M. Van Osdel	" 16	Expenses at 4 meetings	70 ..
202	G. N. Richards	" 18	Printing circulars	35 50
203	J. M Gregory	" 18	Sundry expenses for labor, etc	28 80
204	Elisha Eldred	" 18	Lumber for fence and tank	30 ..
205	Hibbard & Finch	" 18	Tools for farm	208 60
206	*Church, Goodman & Donelly*	" 18	Printing circulars	154 74
207	*Pat. Sullivan*	" 18	2 months' work on farm	40 ..

Statement—Continued.

o whom.	Date.	Object.	Amount.
	1868.		
....	Sept. 18....	1 month's wages as Janitor	$37 ..
.ddock..........	" 18....	1 month's, 2 days' farm work.........	21 33
Periam	" 19....	Boarding farm hands................	48 ..
;ory	" 22....	Salary for September..............	333 33
ander	" 22....	Recording deeds..................	6 75
Co..............	" 22....	Back charges on freight.............	14 32
Thayer...........	" 25....	6 dozen chairs	51 50
.dy	" 25....	2 drums, 2 fifes....................	85
s	" 25....	Salary for September	166 66
ory..............	" 28....	Books for library	600 ..
Co..............	" 28....	Back charges of freight.............	5 10
ker	" 30....	Salary for September	166 67
. Atherton.......	" 30....	" "	166 67
.nart............	" 30....	" "	166 67
. Burrill	" 30....	" "	100 ..
ttuck	" 30....	" "	100 ..
Periam	" 30....	Salary for 3d quarter	875 ..
nyder............	" 30....	Salary for September...............	83 34
foss..............	" 30....	Wages for September	83 33
Express Co......	Oct. 13....	Expressage on chemicals............	9 75
h & Co..........	" 15....	3 tons of coal	17 ..
ranks............	" 15....	Wages for September...............	50 ..
Nichols	" 15....	Flower pots........................	23 71
urley	" 16...	Engineering instruments	234 80
gory	" 16....	Pay-roll of students' work	180 ..
hie & Son........	" 16....	Philosophical and chemical apparatus	186 26
ker	" 17....	3000 brick for hot-house............	30 ..
amb..	" 17....	1 month's services as Janitor.........	37 ..
gory	" 17....	Balance of students' pay-roll of labor	13 90
& Herrick	" 17....	1 bell	9 ..
e.................	" 19....	Painting and paints.................	119 59
& Bowman......	" 19....	3 cubic yards' sand	3 ..
Hodges	" 19....	Hardware..........................	59 12
:k................	" 20....	2 barrels onions....................	80 ..
Briggs & Co......	" 20....	1 gang plow........................	48 ..
'uller & Co.......	" 20....	10 boxes of glass—8x10—for hot-house	42 50
gory	" 20....	Purchase of microscope.............	60 ..
ynch............	" 20....	2 months' work on farm	40 ..
illivan	" 21....	1 " "	20 ..
gory	" 21....	Salary for October	333 33
.ipe	" 22....	1 month's work on farm	20 ..
& Bowman.......	" 26 ...	Gravel for walks....................	35 ..
Coll Coal Co	" 27....	1 car of coal......................	90 ..
me..............	" 27....	Chemicals and apparatus	483 22
. Holmes	" 27....	Boarding farm hands..............	43 03
y	" 28....	Blacksmithing	12 53
e Farmer Co.....	" 28....	Printing 350 circulars	7 50
prague	" 29....	1½ pounds putty....................	6 65
Periam	" 29....	Boarding farm hands	48 ..
& Parker........	" 30....	10 tons hard coal....................	140 ..
ss...............	" 30....	Salary for October	166 67
. Co.............	" 30....	Charges of freight.................	39 43
ker	" 31....	1200 brick for cistern...............	12 ..
tuart............	" 31....	Salary for October.....	166 67
Baker............	" 31....	" "	166 67
attuck...........	" 31....	" "	100 ..
foss.............	" 31....	Wages for October	83 33
. Atherton	" 31....	Salary for October..................	166 66
urrill	" 31....	" "	100 ..
nyder...........	" 31....	" "	83 33
ipe..............	Nov. 2....	Farm work, 2 months' board..........	50
havelin	" 2....	1 month's farm work................	35 00
der	" 2....	Farm work to November 1st..........	62 50
ley	" 4....	Surveying and draughting instrum'nts	110 65
Thorburn........	" 5....	Bulbs..............................	40 49
....	" 6....	Farm expenses	112 21
tle..............	" 7....	4¼ cubic yards sand................	4 25
t................	" 7....	3700 bricks........................	37 ..
ss...............	" 7....	Salary for November and December.	333 34
eld	" 8....	Repairs of farming tools...........	25 ..
gory	" 9....	Balance of account to date	89 12
& Co.............	" 9. ..	Furnaces for library	447 40
Devore...........	" 9....	Farm work—husking..................	15 90
gory	" 16....	Pay-roll of students' labor...........	248 ..
b........	" 16....	Wages for November	37 00

Statement—Continued.

No.	To whom.	Date.	Object.	Amount.
		1868.		
281	Thos. Franks	Nov. 16	Wages for November	[illegible] ..
282	Pat. Lynch	" 17	1 month's farm work	[illegible] ..
283	Thos. Quick	" 18	Expense at Board meeting	[illegible]
284	J. S. Johnson	" 18	" "	[illegible] ..
285	O. B. Galusha	" 18	" "	[illegible]
286	B. Pullen	" 18	" "	[illegible]
287	Sam. Edwards	" 19	" "	[illegible]
288	I. S. Mahan	" 19	" "	[illegible]
289	W. Kile	" 20	" "	[illegible]
290	M. C. Goltra	" 20	" "	11 ..
291	L. M. McMurry	" 20	" "	11 [illegible]
292	W. C. Flagg	" 20	" "	[illegible]
293	A. M. Brown	" 20	" "	[illegible]
294	H. C. Burchard	" 20	" "	[illegible] ..
295	J. M. Gregory	" 20	Salary for November	[illegible]
297	Skinner, Briggs & Enoch	" 20	Repair of farm tools	[illegible]
298	Aaron Potter	" 20	Services as clerk of Treasurer	[illegible] ..
299	H. E. Lapham & Co.	" 20	Lumber and lime	[illegible] 71
300	Beidler & Kratz	" 20	Lumber for hot-house	[illegible]
301	G. N. Richards	" 20	Printing chemical labels	9 ..
302	E. V. Peterson	" 20	Stationery, etc.	11 [illegible]
303	A. Campbell	" 20	Roof repair	[illegible] ..
304	Walker Bros	" 20	Lumber and dressing	[illegible]
305	Trevitt & Greene	" 20	Hardware	[illegible]
306	Henry Swanell	" 20	Paints and glass	[illegible] 14
307	Joseph McCorkle	" 20	Hardware	17 [illegible]
308	W. C. Flagg	" 24	Expenses at Board meeting	14 [illegible]
309	Thos. Devore	" 25	Farm work, husking	[illegible] ..
310	Lemuel Allen	" 25	Expenses at Board meeting	[illegible]
311	Ermentrout & Alexander	" 26	262 posts at 12½ cents	[illegible] 77
312	James M. Rolfe	" 27	Mason work, hot-house and cistern	[illegible] 51
313	L. N. Lawrence	" 27	Expense at Board meeting	24 [illegible]
314	A. Avey	" 28	Blacksmithing	[illegible] 50
315	Prairie Farmer Company	" 28	Advertising	90 .
316	A. Blackburn	" 28	Expense at Board meeting	23 70
317	A. P. S. Stuart	" 30	Salary for November	166 66
318	Geo. W Atherton	" 30	"	166 66
319	W. A. Baker	" 30	"	166 66
320	S. W. Shattuck	" 30	"	100 ..
321	Thos. J. Burrill	" 30	"	100 ..
322	E. Snyder	Dec. 1	"	100 ..
323	J. S. Searfoss	" 1	Wages for November	[illegible] 34
324	J. H. Blakesly	" 2	Farm work one month	[illegible] ..
325	Jonathan Periam	" 2	Boarding farm hands	40 ..
326	J. H. Pickrell	" 3	Expense to Board meeting	10 45
327	Flynn & Scroggs	" 4	Printing and advertising	25 50
328	Bullock & Crenshaw	" 6	Chemicals and apparatus	[illegible] 87
329	George Stipe	" 6	1 month's work on farm	[illegible] ..
330	Sam. McKinzie	" 6	Gravel for walks	30 ..
331	Western Rural	" 6	Advertising	24 ..
332	J. S. Busey	" 7	5 cords wood	21 25
333	J. M. Gregory	" 7	Pay-roll of students' labor	[illegible] ..
334	A. F. Childs	" 8	Drain tile for farm	150 ..
335	J. M. Gregory	" 11	Salary for December	333 34
336	Pat. Sullivan	" 11	2 months' farm work	40 ..
337	Elisha Eldred	" 11	Lumber bill	270 25
338	Walls Coll. Co	" 11	2 cars of coal	40 ..
339	Beach & Co	" 15	Balance of coal bill	8 70
340	Thos. Franks	" 16	Wages for December	50 ..
341	Hulburd & Herrick	" 22	Hardware	9 .
342	Pat. Lamb	" 22	Wages for December	37 ..
343	G. W. Atherton	" 23	Salary for December	166 66
344	J. S. Searfoss	" 23	Wages for December	83 33
345	W. J. Ermentrout	" 23	Insurance	50 ..
346	Pat. Sullivan	" 25	Wages farm-hand, 1 month	20 .
347	Pat. Lynch	" 25	Farm work, 2 months'	40 ..
348	George Stipe	" 25	Farm work 1 month to December 31st	35
349	Fritz Finder	" 25	Farm work 2 months to December 31st	70 .
350	Aug. Shavelan	" 25	Farm work 2½ months to Dec. 31st	87 50
351	J. H. Blakesly	" 25	Farm work 1 month and 3 days	37 35
352	S. R. Walker	" 26	1500 brick for still	18 .
353	Prof. W. A. Baker	" 28	Salary for December	166 66
354	A. P. S. Stuart	" 28	"	166 66
355	*S. W. Shattuck*	" 28	"	100 ..
356	*T. J. Burrill*	" 28	"	100 ..

Statement—Continued.

To whom.	Date.	Object.	Amount.
	1868.		
an Periam	Dec. 28	Salary for last quarter	$875 ..
ydor	" 28	Salary for December	100 ..
heldon	" 28	Insurance on building	50 ..
& Sweet	" 28	" "	151 80
ilchner	Jan. 6. 1869	Desk for chemical laboratory	26 26
Burchard	" 18	Expressage board meeting	23 70
an Express Co	" 18	Expenses on books	16 70
Franks	" 18	Wages University gardener	50 ..
amb	" 18	Wages of Janitor	57 ..
Van Osdel	" 21	Expense of board meeting	18 60
Goltra	" 21	" "	13 10
Childs	" 21	2000 drain tile	120 ..
l Co	" 21	Printing catalogues	54
Coal Co	" 21	1 car of coal	20 ..
olman	" 21	Advertising in Rural World	25 ..
K. Hosford	" 21	Lamps and burners	26 15
Avey	" 21	Blacksmithing	11 76
essel	" 21	Harness and repair	119 25
Gregory	" 21	Account of petty expense	47 19
& Heffron	" 21	Flower pots for hot house	17 57
Henderson	" 21	1 copper stil. (chemical laboratory)	14 ..
A. Warder	" 26	Salary for lecturing	400 ..
Gregory	" 26	Students' labor—pay-roll	74 ..
an Periam	" 26	Farm expense at University	90 09
Flagg	" 26	Expense course of lectures	288 45
Dunlap	" 26	Expenses at Board meeting	23 75
J. Burrill	" 26	Salary for January	100 ..
ok & Parker	" 30	10 tons hard coal for furnace	140 ..
W. A. Baker	" 31	Salary for January	166 66
Bliss	" 31	" "	166 66
S. Stuart	" 31	" "	166 66
Shattuck	" 31	" "	100 ..
yder	" 31	" "	100 ..
earfoss	" 31	Wages for January	83 33
can Express Co	" 31	Express on books	20 50
Gregory	Feb. 5	Salary for January	333 33
er & Co	" 5	4200 pounds hard coal	33 60
Coal Co	" 5	1 car of coal	20 ..
Pinder	" 7	Wages for January	25 ..
Blakesley	" 7	Wages for January and board	35
mpbell	" 15	Repairing roof	10 ..
amb	" 16	Wages as Janitor	57 ..
Dare	" 23	12 days' work	18 ..
Gregory	" 23	Periodicals for library	164 68
Baker	" 28	Salary for February	166 66
Bliss	" 28	" "	166 66
Stuart	" 28	" "	166 65
Shattuck	" 28	" "	100 ..
J. Burrill	" 28	" "	100 ..
yder	" 28	" "	100 ..
earfoss	" 28	Wages "	83 33
Gregory	" 28	Salary "	333 33
yder	" 28	Pay-roll of students' labor	63 ..
Pinder	" 28	Wages for February (farm)	25 ..
Blakesley	" 28	" "	35 ..
havelan	" 28	" "	25 ..
amount of warrants drawn			$36,008 09

Classified Statement of Expenditures.

Board expense	$[illegible] [illegible]
Library	[illegible] 13
Landscrip	219 [illegible]
Salaries	12,000 [illegible]
Chemical apparatus	973 [illegible]
Engineering instruments	845 46
Philosophical apparatus	504 [illegible]
Fuel, lights, repairs, and all incidental expenses	3175 [illegible]
Improvements and alterations in buildings and grounds	[illegible] 13
Farm and garden, purchase of teams, wagons, implements, fencing and building of barn, etc., and running expense	[illegible] 25
Total	$36,[illegible] [illegible]

MINUTES OF MEETINGS OF EXECUTIVE COMMITTEE DURING 1868.

UNIVERSITY BUILDING, *April* 28, 1868.

At a called meeting of the Executive Committee and the Committee on Buildings and Grounds, held at the Industrial University, there were present only the Regent, Messrs. J. O. Cunningham and M. C. Goltra.

No quorum being present, the meeting was adjourned to meet in two weeks from date.

JONATHAN PERIAM, *Secretary.*

UNIVERSITY BUILDING, *May* 12, 1868.

The adjourned meeting of April 28th, was called to order at the office of the Regent, at 9 A. M.

Present—The Regent, Messrs. Cunningham, Goltra, VanOsdel, Mahan, Quick and Cobb. Absent—Messrs. Pullen and Harding. The gentlemen comprising the Committee on Buildings and Grounds were invited to sit with the Executive Committee.

The REGENT was requested to correspond with manufacturers for the purpose of purchasing cloth for uniforms.

The following bills were then audited and allowed, and it was ordered that a warrant be drawn, in favor of the Regent, for their payment:

Waterbury Button Company	$43 75
Waterbury Button Company	20 00
Dodson & Hodges	57 95
Hall & Peterson	18 18

Jonathan Periam	$140 15
Beidler & Kratz	28 17
C. J. Larned & Co	64 15
Samuel Houston	8 00
J. M. Davis	21 70
Flynn & Scroggs	87 00
On motion, Dr. Scroggs was allowed $186 68	
Off credit 65 00	
Leaving balance due him	101 68
Parke & Rogers	7 80
Wm. Rice	413 25
Hulburd, Herrick & Co	3 12
Labor of students, April, 1868	95 17
N. J. Swarey	20 00
M. L. Dunlap	25 00
S. Riehl	7 50
A. M. Griswold	4 00
J. S. Searfoss	83 34
A. N. J. Lewis	39 60
George Landberger	400 00
James Braddock	20 00
Aaron Potter	20 00
Aaron Potter—freight on his household goods was made free to him.	
M. C. Goltra	842 55
Elisha Eldred	180 00
Charles Dalton	25 00
Union Coal Mining Company	14 00
J. M. Boatman	2 75
Frederick Finder	60 00
Robert Rolston	60 00
Jonathan Periam	127 00
F. D. Rexford	32 40
Hamar & Green	120 92
Hovey & Nichols	59 91
L. Vandersyde	8 25
Jackson Burke	12 50
S. J. Percival	35 00
Williard & Finch	120 00
Palmer, Fuller & Co	74 00
Thomas Quick	384 00
H. C. Stewart	300 00
A. W. Andrews	30 00
Adams, Blackmer & Co	6 00
Aaron Potter	10 70

It was voted that when the Committee adjourned, they should adjourn to meet at the University Building, June 11th, 1868.

It was voted that the Regent and Farm Superintendent be authorized to employ a gardener, and it was also voted that a sum not exceeding $400 be appropriated for repairing farm buildings and fences.

JONATHAN PERIAM, Secretary.

UNIVERSITY BUILDING, *June* 11*th*, 1868

The Executive Committee met at 7 P. M.

Present—Messrs. Quick, Cunningham, Goltra, VanOsdel, Pullen, Cobb, Mahan, and the Regent.

Mr. Periam being absent, I. S. Mahan was chosen Secretary, *pro tempore.*

Voted that the amount of freight charged by I. C. R. R. Co., for the transportation of the Regent's household goods, is hereby donated to the Regent, amounting to $38.

J. O. CUNNINGHAM was appointed a committee to examine the freight accounts of the past year, and report to this Committee.

The REGENT made a verbal report in reference to warrants drawn for labor on grounds, in relation to the expenditure of $1500, and vouchers showing the expenditure of all but $426 55; also vouchers showing payment of the last named $126 55—all of which was referred to the Board of Trustees. The following bills were allowed:

J. M. & A. Avey	$14 15
F. C. Gill & Dodson & Hodges	20 10
J. O. Alexander	6 75
Elisha Eldred	545 37
Fairbanks, Greenleaf & Co	15 20
Hulburd, Herrick & Co	10 75
C. D. Gregory	15 00

On motion of Judge J. O. CUNNINGHAM, the Regent was requested to issue a suitable circular and catalogue for the ensuing year.

The Committee then adjourned to meet again, Friday, June 12th, 1868.

JONATHAN PERIAM, *Secretary.*

FRIDAY, *June* 12*th*, 1868.

The Committee met at the University, at 9 A. M., and the following bills were allowed:

Robert Rolston	$40 00
S. S. Percival	17 10
Hanson Henry	48 66
S. M. Dunsche	8 00

John L. Davis	$33 00
S. J. Searfoss	83 07
Fuller, Finch & Fuller	49 58
Fuller, Finch & Fuller	44 18
David G. Ayres	25 44
Patrick Lamb	37 00
A. M. Cherry	2 75
Chas. Sherman	16 50
E. W. Holmes	128 00
Elisha Eldred	154 13
Angle & Sabin	33 50

On motion of Judge CUNNINGHAM, the sum of $9 was appropriated for the purchase of a suitable bell.

On motion of EMERY COBB, the Regent and Judge Cunningham were appointed a committee to purchase a suitable bell.

The bill of Aaron Potter was allowed for $61 80.

A motion for an appropriation for the purchase of musical instruments, being made, after discussion, on motion of M. C. GOLTRA, the Regent and Judge Cunningham were appointed a committee to purchase a bass drum, a snare drum and a fife, and to report to the Board of Trustees in relation to the purchase of other instruments.

Professor G. W. Atherton reported a bill for the labor of students, amounting to $180, which, upon motion of EMERY COBB, was allowed.

It was moved by M. C. GOLTRA, and seconded, that the recording Secretary be requested to write to ex-Secretary O. B. Galusha, inquiring after the books and records. Carried.

On motion of I. S. MAHAN, after some discussion, it was

Resolved, That a committee of three be appointed, to inquire into the cost of procuring tile, the propriety of underdraining, and to procure and examine specimens of tile.

Messrs. Quick, Mahan and Periam were so appointed.

The REGENT called attention to the fact that scrip is now selling at over $1 per acre; and asked if some action should not be taken in relation to 75,000 acres now on hand. It was moved by M. C. GOLTRA, and seconded, that 50,000 acres of scrip be sold, with the concurrence of a majority of the Board of Trustees, provided that it be sold at not less than $1 10 per acre. The Finance Committee and Treasurer being authorized to sell upon the written consent of a majority of the Board of Trustees, as above; and consent was accordingly given, in writing, as follows:

ıigned, Trustees of the Illinois Industrial University, hereby consent
ıe sale of fifty thousand (50,000) acres of scrip, by the financial com-
; less than one dollar and ten (1 10) cents per acre.

I. S. MAHAN,
B. PULLEN,
J. O. CUNNINGHAM,
M. C. GOLTRA,
EMERY COBB,
J. W. SCROGGS,
THOMAS QUICK.

owing preamble and resolution were then offered by
MAHAN:

the Board of Trustees, at the annual meeting in March, 1868, offered a
·oposing a revision of the charges for room rent, tuition and incidental
ich was, by vote of said board, referred to this committee for its con-
d action; therefore,
hat hereafter charges for room rent and incidental expenses and tuition
:

nt per term, for each student..$3 00
al expenses.. 2 50

lation fee of $10 shall be paid by each student upon entering the Uni-
before being entitled to enter the classes, besides which no charges
tuition shall be made against students: *Provided*, that nothing herein
ıll be so construed as to prevent the Faculty from admitting such indi-
s free, to the privileges of the University, as shall, in their judgment, be

the table.
ion, Emery Cobb was added to the committee for ex-
reight account.
noved by Judge CUNNINGHAM, and seconded, that assis-
ssors be paid not to exceed ($1,200) twelve hundred
r annum. Carried.
COBB, that the Regent be authorized to draw a warrant
two hundred dollars, to pay Prof. T. J. Burrill.
ɔn to adjourn was carried.

JONATHAN PERIAM,
Secretary.

UNIVERSITY BUILDING, *Sept.* 16*th*, 1868.

ıt to call, the Executive Committee met at the Regent's
o'clock, A. M.

Present—Messrs. Quick, Van Osdel, Cunningham, Pullen, Mahan and the Regent.

The following bills were allowed :

E. S. Ritchie & Son	$506 50
Hibbard & Finch	238 40
Elisha Eldred	6 34
A. S. Rader	5 63
J. J. Osfield	25 10
George Sandberger	40 00
Hovey & Nichols	9 00
Dodson & Hodges	669 91
Bord & Chandler	35 30
Mrs. Mary Coffee	7 05
William P. Sweet	41 15
F. M. & A Avey	24 00
Thomas Franks	40 00
Thomas Franks	40 00
Thomas Franks	36 15
Journal Company	163 75
Hamar & Green	13 83
Rupert & Trevett	61 71
John Kinney	35 00
John Kinney	46 66
D. G. Ayres	16 50
D. G. Ayres	39 19
D. G. Ayres	13 75
J. S. Searfoss	83 33
J. S. Searfoss	83 34
J. S. Searfoss	83 33
James Lynch	35 00
James Lynch	29 35
Patrick Lynch	20 00
Patrick Lynch	20 00
Patrick Lamb	30 00
Patrick Lamb	37 00
Patrick Sullivan	20 00
G. W. Holmes	28 82
G. W. Holmes	68 00
Fritz Finder	60 00
George Sandberger	40 00
J. E. Mayhew	16 12
J. E. Mayhew	22 00
W. H. Crayne	22 13
W. H. Crayne	13 50
J. N. Wharton	14 62
Albert Russell	2 25
James Braddock	40 00
James Braddock	40 00
David G. Ayres	35 06

Chas. E. Allard	4 70
A. L. Rader	21 00
A. Potter	3 50
J. L. Davis	20 90
J. L. Davis	36 00
S. M. Busey	25 00
Fairbanks, Greenleaf & Co	100 00
Gammon & Brindle	27 00
Fuller, Finch & Fuller	49 86
Champaign Union	12 50
N. Bateman	14 82
Jonathan Periam	272 50
Jonathan Periam	56 00
B. C. Beach, referred, with power, to the Regent	6 00
Church, Goodman & Donnelly	154 74
Pat. Lamb	37 00
T. J. Burrill	200 00
G. N. Richards	35 50
Root & Cady	35 00
Thos. Quick	27 65
B. Pullen	19 70
I. S. Mahan	20 45

It was moved and seconded that ($368 69) three hundred and sixty-eight dollars and sixty-nine cents be appropriated for chemicals; and it was moved that ($439 45) four hundred and thirty-nine dollars and forty-five cents be appropriated for chemical apparatus. Carried.

It was moved and seconded that a forcing pit or propagating house be built, at a cost of about ($250) two hundred and fifty dollars. Carried.

On motion of Mr. Van Osdel, the Regent was authorized to buy a good mounted microscope, not to exceed ($250) two hundred and fifty dollars. Carried.

The report of Committee on Drainage was then received:

REPORT OF COMMITTEE ON DRAINAGE.

To Executive Committee of Illinois Industrial University:

Your special committee, to whom was referred the matter of underdraining, would respectfully report:

We recommend that the 40 acre plot that is to be devoted to horticultural purposes, be underdrained with tile, this fall. A portion of this land is wholly unfit for the purpose for which it is designed without underdraining; but with underdraining it at once becomes very valuable For both experimental and practical gardening we believe it indispensable.

The cost of the tile will be nearly $800. They can be procured of A. F. & G. Childs, on the line of the I. C. R. R., at Anna, and will be warranted against breakage and the effects of the elements.

The work of surveying and superintendence could be done by persons already permanently employed in the institution. The further cost of labor would probably be about $1,200—total cost $2,000.

Respectfully submitted,
I. S. MAHAN,
THOS. QUICK,
JONATHAN PERIAM.

Ordered to be laid on the table for discussion at the evening session.

The bill of Elisha Eldred, for lumber and fencing, for $80, was allowed.

On motion, Judge Cunningham and J. Periam were associated as a committee to rent the Griggs' farm for the ensuing year. Carried.

Motion to adjourn to 7 o'clock, P. M. Carried.

JONATHAN PERIAM,
Secretary.

EVENING SESSION.

The Committee were called to order at 7:15 P. M.

It was moved and seconded, that the Board of Trustees be requested to meet on Wednesday, the 18th of November, 1868. Carried.

After discussion, it was moved and seconded, that the drainage of the garden plat and the experimental farm be prosecuted, at an expense not to exceed $1,200. Carried.

It was moved and seconded, that such alterations in the university building be authorized as will secure a dining room in the basement, and leave the present dining room free for a library and reading room. Carried.

Also, that the laboratory be fitted up with the necessary tables and fixtures. Carried.

It was moved that the library room be furnished with portable furnaces and pipes, for heating the recitation rooms and chapel. Carried.

The Regent's bill for unexpended balance of warrant 98, for the past year (1867), for $426 55, with vouchers, was examined, and the balance of $23 80, as due him, was allowed.

It was directed that the Professor of Chemistry keep an account of the chemicals used by each student, and the compensation for their use be left to the full Board.

J. M. Van Osdel's bill for $70, for attendance at four meetings, was allowed.

It was moved and seconded, that the Regent be authorized to procure six dozen additional chairs for recitation room and chapel. Carried.

The farmer was authorized to procure seed of five varieties of winter wheat, sufficient to seed ten acres of land, for experiment.

On motion, the meeting was adjourned, subject to the call of the Regent.

JONATHAN PERIAM,
Recording Secretary.

MINUTES OF MEETINGS OF EXECUTIVE COMMITTEE,

FROM JANUARY TO JUNE, 1869, INCLUSIVE.

UNIVERSITY BUILDING,
URBANA, ILLINOIS, *January* 21*st*, 1869.

Pursuant to call, the Executive Committee met, at the Regent's office, at 9 o'clock A. M.

Present—Messrs. Cobb, Cunningham, Goltra, Van Osdel, and the Regent.

On motion of Mr. EMERY COBB, the Regent's bill for balance of $4 28, for books for library, was allowed—the whole amount of said bill being $604 25.

Also, the following bills were allowed:

Samuel Richener's bill, for making desks, balance $28 75—whole amount of same being	$35 00
Hovey & Heffron	17 57
F. M. & A. Avey	11 78
G. E. Hessell	119 25
J. S. Henderson	14 00
James M. Thorburn & Co.	40 49
Rural World	25 00
Iowa Homestead	2 00
American Naturalist	5 50
North-Western Farmer	1 00
Ohio Farmer	2 00
Horticulturist	1 75
Journal of Agriculture	1 50
American Entomologist	75
Rural World	2 00

On motion of Mr. VAN OSDEL, the amount of $16 50 was ordered to be taken from the library account.

McKinzie & Bowman	$65 00
J. M. Gregory	47 19
Wall's Coal Mining Co:	40 00
Thomas Franks	50 00
George Stipe	35 00
Patrick Sullivan	40 00
Patrick Sullivan	20 00
Holbrook & Parker	140 00
Fritz Finder	70 00
A. Scharelon	37 00
J. A. Busey	21 25
Western Rural	24 00
A. F. & G. Childs	150 00
Elisha Eldred	270 00
B. C. Beach & Co	8 70
Bullock & Crenshaw	384 87
R. S. Walker	18 00
American Express Co	15 70
J. H. Blakesley	37 35
Patrick Lamb	37 00
Patrick Lamb	37 00
George Stipe	35 00
J. S. Searfoss	33 33
Geo. K. Hosford (amount left blank at request of Regent)	
Wall's Coal Company	20 00

On motion of J. O. CUNNINGHAM, 1500 copies of catalogues were ordered.

On motion of J. M. VAN OSDEL, there was appropriated from library fund ——— dollars, for periodicals, foreign and American.

On motion of Mr. GOLTRA, the Regent was authorized to procure a wood-cut of the farm, for insertion in the catalogue.

On motion of Mr. CUNNINGHAM, the Regent was authorized to draw a warrant to pay lecturers.

On motion of Mr. VAN OSDEL, it was

Resolved, That the present course of lectures delivered by Dr. Warder be limited to twelve.

Bill of Journal Company, Springfield, was allowed, for $34.

The following preamble and resolution were offered by Mr. COBB, and carried:

Section 6, of the state laws, entitled "An act to provide for the organization and maintenance of the Illinois Industrial University," says: "No money shall be drawn from the treasury, except by order of the board of trustees, on warrant of the regent, drawn upon the treasurer, and countersigned by the recording secretary."

This section pre-supposes that the regent, treasurer and recording secretary will all reside where the institution is located. This not being the case, be it therefore,

Resolved, That all appropriations of money by this board be made for specific purposes and classified accordingly, stating amount appropriated for each; and that it shall be the duty of the recording secretary to furnish the regent and treasurer with a copy of such appropriation; and that all warrants drawn by the regent shall mention for what purpose drawn and the fund chargeable therewith.

On motion of Mr. Goltra, the following gentlemen—Messrs. Cunningham, Dunlap and Cobb—were appointed a committee to make arrangements for and receive the members of the legislature, with power to audit the necessary bills made.

On motion, one hundred additional loads of gravel were ordered to be bought.

The fees of Mr. Cushing, whose health did not permit him to remain at the University, were remitted.

On motion, the committee adjourned.

Jonathan Periam, *Secretary.*

APRIL MEETING—1869.

University Building,
Urbana, Illinois, *April 8th*, 1869.

The Executive Committee met at the Regent's office—and the meeting was called to order by the Regent, at 10:15, A. M.

Present—the Regent, Messrs. Cobb, Pickrell, Cunningham, Goltra and Wright.

Absent—Messrs. Brown of Pulaski, Griggs and Pullen.

On motion of Mr. Goltra, it was voted that Messrs. Johnson and Allen, who were engaged in an adjoining room with the business of the Agricultural committee, be invited to sit at their convenience with the Executive Board.

After considerable discussion of the limits of the jurisdiction of the Committee on Agriculture and Horticulture and the committee on Buildings and Grounds, the following resolution was adopted, on motion of Mr. Cobb:

Whereas, the territory and duties of several of the committees have never been precisely settled by the board; and whereas, it has become a matter of present practical importance that these duties and territories be more definitely settled; therefore,

1st. *Resolved*, That until the meeting of the board the Horticultural Committee shall have charge of the 40 acre tract, the orchard on the western part of the experimental farm and ornamental grounds.

2d. *Resolved*, That the Agricultural Committee shall have charge of the stock farm and the experimental farm, except so much of the latter as shall be occupied by the orchards, to which is hereby assigned the 53 acres lying west of the line Wright street.

On motion of Mr. COBB, it was voted that the bills of "Prairie Farmer" and "Western Rural," and such other papers as may have bills against the Illinois Industrial University, for advertising winter lectures, be referred to the Corresponding Secretary, to report to this Committee, as soon as practicable, as to their correctness.

The bill of Dodson and Hodges, $32 48, was then audited and allowed.

On motion of Judge CUNNINGHAM, the Committee adjourned to 1:30 P. M.

AFTERNOON—1:45 P. M.

The Committee met, pursuant to adjournment, and the following bills were audited and allowed:

Prairie Farmer, March 19th, 1869, advertising seed corn	$19 20
A. F. Childs, March 27th, draining tile	126 00
Hulburd, Herrick & Co., March 30th, hardware	28 40
Elijah Eldred, March 29th, lumber	90 79
" " 31st, "	201 45
" " " "	90 31
E. Snyder, April 8th, postage and petty expenses	30 87
Wall's Colliery Coal Mining Company, March 30th	20 00
S. D. Childs, jr. & Co., seal and press, March 30th	20 00
Chas. W. Rolfe, March 30th, pump	12 55
Hovey & Heffron, March 26th, kitchen garden and flower seeds	24 07
Seed for market garden	34 80
Garden syringe, etc	18 50
Fuller, Finch & Fuller, March 29th, oil and lead	88 90
Miller & Toll, muslin	2 00
Trevett & Green, hardware	9 05
Trevett & Green, twine	40
J M. Campbell, seed oats	37 87
W. F. Bliss, two sugar hogsheads	2 00

On motion of Judge CUNNINGHAM, it was ordered that Dr. Warder's bill for $150, for three lectures delivered in January, 1869, be referred to the Corresponding Secretary, with instruction to report, for the information of the Executive Committee, the particulars of the arrangement made with Dr. Warder.

A recommendation from the Faculty "that the rooms south of the library should, at as early a day as possible, be prepared for the reception of the geological and mineralogical cabinets," was, on motion of Judge CUNNINGHAM, adopted; and it was ordered that it be carried out immediately.

The Regent presented the following proposition, from Prof. Burrill, for the sale of a cabinet of minerals now on exhibition in the library room of the University:

INDUSTRIAL UNIVERSITY, *April 8th*, 1869.

GENTLEMEN: The cabinet of fossils and minerals, now in cases in the University, and belonging to Mr. M. S. Hall, has been left in my hands for sale. Mr. Hall's price is $1000; but, owing to pressing demands for money, he is desirous of disposing of it, even though a much less sum be obtained.

The following statement, based upon my own count and estimate—the latter drawn from every source of information at hand—may aid in determining the value of the collection:

750 fossil plants, of about 35 distinct species, being about one fourth of those known to exist in Illinois—40 cents, each	$300 00
25 extra fine geodes, at $3	75 00
70 medium " 1	70 00
70 smaller " 30 cents	21 00
40 specimens of minerals, granites, etc., 40 cents	16 00
60 fine specimens of pol. marble, agate crystal spars, at $3	180 00
200 animal fossils, at 30 cents	60 00
Total	$722 00

Duplicate specimens, if valuable separately, are equally so for exchange; but as there are many of these, and exchanges will be attended with some expense, and also making due allowance for the sale of a whole collection rather than by single specimens, I offer it to you for the sum of six hundred dollars.

T. J. BURRILL.

On motion of Judge CUNNINGHAM, it was voted that the proposition be referred to Prof. Stuart for an opinion in regard to the propriety of making the purchase, with instructions to report to the next meeting of the committee.

On motion of Judge CUNNINGHAM, it was voted that the proposed change of the walk running parallel with the main drive on the west side of the grounds be entrusted to Mr. Franks.

On motion of Mr. Cobb, it was voted that the appropriation made for buildings and grounds, allowing $2,575, be disbursed by the Regent, with the advice and consent of the chairman of the Committee on Buildings and Grounds.

On motion of Judge Cunningham, it was ordered that regular monthly meetings of this committee be held on the first Wednesday of each month, for the transaction of business.

On motion of Judge Cunningham, it was ordered that the carpenter be instructed to complete, as soon as possible, the sidewalk on the street in front of the University building as heretofore ordered.

On motion of Judge Cunningham, the following preamble and resolution were adopted :

Whereas, the Regent has offered to visit some of the chief Industrial schools of Europe, during the summer vacation, at his own expense, to observe carefully their methods and facilities of instruction, to aid in the further development of the University ; and whereas, such observations, at the present stage in the progress of the University, seem important and may prove of great benefit ; therefore,

Resolved, That leave of absence be granted to the Regent from the middle of May to the opening of the autumn term ; and he be requested to make thorough examination and copious notes of such things, in the several agricultural and polytechnic schools he may visit, as may serve to aid us in the more perfect organization of this Industrial University.

On motion of Judge Cunningham, it was voted that the authorities of the town of Urbana be requested to vacate the public road on the east and south side of the northwest quarter of the northwest quarter of section 19, township 19, range 9, and to locate a road on the north side of said tract, to connect the road, as now laid on the north side of said section 19, with the road laid on the range line between ranges 8 and 9.

The Agricultural Committee brought in their report; which was recommitted, with instructions to report to the Executive Board.

An application of Prof. Wm. M. Baker, for permission to have his lumber purchased and shipped with the lumber of the University, was not granted.

On motion of Mr. Pickrell, it was

Resolved, That the state appropriation made for the Agricultural department be appropriated for the purposes named in the act ; that the state appropriation made for the Horticultural department be appropriated for the purposes named in the act ; that the state appropriation for the Chemical department be appropriated for the

purposes named in the act; and that the state appropriation made to be used for other apparatus and books be appropriated for purposes named in the act.

On motion, the Committee adjourned, to meet Wednesday, May 5th, 9 A. M.

J. M. GREGORY, *Regent.*

W. F. BLISS, *Secretary.*

MAY MEETING, 1869.

UNIVERSITY BUILDING,
URBANA, ILLINOIS, *May 5th*, 1869.

The Executive Committee met, pursuant to order, at the Regent's office, at 9½ o'clock A. M.

Present—Messrs. Cunningham, Goltra, Pickrell, Pullen and the Regent.

Absent—Messrs. Cobb, A. M. Brown, Wright and Griggs.

The Regent read the following statement of the book-keeper, of accounts, from March 12th to present date:

EXPENDITURES.

Board expense	$520 25
Salaries	8,046 94
Farm account	603 82
Building account	29 15
University grounds	291 49
Chemical laboratory	61 05
Library account	21 50
Student's labor	117 60
Fuel and lights	60 00
Material and lumber in hands of carpenter	563 35
Purchase of 2 lots	425 00
Salaries of treasurer and corresponding secretary	700 00
Stationery, etc	20 90
University seal	20 00
Visit of legislature	66 00
University buttons	25 00
Incidental expenses	272 42
Total expenses	$6,927 80

There have been collected by me, and remitted to the treasurer, the following amounts:

March, 1869, various fees	$612 00
Farm produce	125 45

April, 1869, fees	$72 50
Collected for coal	39 48
Total	$849 48

Respectfully,

E. SNYDER, *Book-keeper.*

The following accounts were then examined and allowed:

May 3d, C. G. Larned, hardware, etc., for laboratory	$30 15
April 10th, Johnson, Myers & Co., repairing agricultural implements	6 45
April 17th, F. K. Phœnix, flowers and seeds	22 60
April 10th, Adams, Blackmer & Lyon, pamphlet cases	21 60
April 26th, D. W. Weir, trees	58 00
April 23d, R. B. Nelson, whitewashing and plastering	25 15
April 16th, Moulding & Harland, flower pots	15 75
April 23d, Union Coal Co., 1 car coal	15 00
April 23d, Fuller, Finch & Fuller, 2 boxes glass	8 88
May 3d, Chas. G. Larned, hardware	3 25
April 13th, C. W. Beyer, insurance on library	21 50
May 4th, Prof. Stuart, expenses for chemicals	4 57
May 3d, F. M. Avey, blacksmithing	12 50
May 4th, Hibbard & Finch, seeds and plow	33 0
May 4th, Trevett & Green, Hardware	15 70
May 4th, E. T. Whitcomb, recording deeds	3 75
May 4th, G. Hessell, harness repairs	7 95
May 4th, G. K. Hosford, oil, chimneys, etc	7 72

The Committee on Buildings and Grounds offered the following:

The Committee on Buildings and Grounds, on examination, finding that the cast iron water-table proposed, by the Committee, will be of inferior value and efficiency to a water-table made of tin or galvanized iron, with a timber so placed as to make a proper projection, do hereby recommend such change in the plan, and ask the Executive Committee to authorise the same.

Respectfully, submitted,

M. C. GOLTRA, *Chairman,*
J. O. CUNNINGHAM,
J. M. GREGORY.

On motion of Mr. PULLEN, the recommendation was accepted and the change authorized.

On motion of Judge CUNNINGHAM, it was voted that the Regent be authorized to make such purchases of books and apparatus, in Europe, as he may find can be made with advantage there; and that, for this purpose, the necessary warrants be drawn on the appropriation made for library and apparatus.

On motion of Mr. PICKRELL, it was voted that a warrant of $1,000 be drawn for the Committee on Locating Lands, and

accounted for by said committee, as fees and expense in locating said land scrip.

On motion of Judge CUNNINGHAM, it was

Resolved, That the faculty be authorized to publish such catalogue and circular as, in their judgment, may be deemed necessary.

Adjourned to meet at the call of the Regent.

AFTERNOON.

The Committee was called to order in Dr. Gregory's library, at 12:30 P. M.

On motion, it was voted that Prof. Stuart be authorized to have the room intended for a laboratory enlarged.

Permission was given to the Professor of Agriculture to have put up in his room a case for agricultural specimens, books and documents.

The following communication was received from Prof. Stuart:

The undersigned, to whom was referred the valuation of the cabinet offered for sale by Prof. Burrill, respectfully begs leave to report that, in his judgment, the said cabinet is worth $500.

A. P. S. STUART.

URBANA, *May 5th*, 1869.

On motion of Mr. PULLEN, the report of Prof. Stuart was accepted, and the Regent was authorized to purchase the cabine for $500, subject to the State appropriation.

On motion of Mr. GOLTRA, it was voted that the Regent be requested to purchase a pump for the well of the University.

On motion of Judge CUNNINGHAM, it was voted that the salary of the Regent to the first of September, 1869, be paid in advance.

On motion of Judge CUNNINGHAM, it was voted that the gardener's house be located at such point on Green street as the Regent and the Professor of Agriculture may determine.

On motion of Mr. PULLEN, it was voted that the experimental orchard be planted in quincunx order, with trees 24 feet apart, and that the East and West avenue be extended to the western line of the orchard.

On motion of Mr. PICKRELL, the Recording Secretary was authorized to purchase a desk for his office and procure a copying press.

On motion of Judge Cunningham, it was

Resolved, That the Regent be authorized to purchase such amount of hard coal as, in his judgment, may be required for the use of the University during the winter months.

On motion of Mr. GOLTRA, it was ordered that in planting hedges on the outside of the experimental farm, they be set two rods from the lines on each side of the same, except on the west side, along Wright street, where the hedge shall be set 14 feet from the line, and along Mount Hope avenue, where it shal. be set 40 feet from the line.

Proposals for a new roof on the University building were then opened, in presence of the committee, and, on motion of Mr. PICKRELL, referred to the Regent and Judge Cunningham, with power to act.

J. M. GREGORY, *Regent.*

W. F. BLISS, *Secretary.*

JUNE MEETING.

UNIVERSITY BUILDING,
URBANA, *June* 2, 1869.

The Executive Committee was called to order in the Regent's office, at 10 o'clock, A. M., and, in the absence of the Regent, Mr. Goltra elected chairman.

On calling the roll, it was found that only Messrs Cobb, Pickrell, Cunningham and Goltra were present; and, on motion of Mr. Pickrell, the Committee, for want of a quorum, adjourned to Wednesday, July 7, the time of their next regular meeting, without transacting any business.

M. C. GOLTRA, *Chairman*

W. F. BLISS, *Secretary.*

AGRICULTURAL LECTURES AND DISCUSSIONS.

Following the precedent of the Yale agricultural lectures of 1860, the following course of agricultural lectures and discussions were held at the Industrial University, in January of 1869.

A number of gentlemen from Illinois, Missouri and Michigan, all eminent in their respective specialties, kindly consented to aid gratuitously in the inception of the first of what it is to be hoped will be a long series of farmer gatherings for mental instruction in the art and science of agriculture.

Prof. Bliss and Sanford Howard were unable to fill their appointments. With these exceptions (resulting from circumstances beyond the control of the gentlemen mentioned) the lecturers were all able to be present, and performed the parts assigned them.

A large portion of these lectures have been solicited for and published in the Missouri Agricultural Report, for 1868, with the following note by the Secretary, Dr. L. D. Morse:

"Thus was inaugurated a new and probably important movement in Western agricultural education and improvement. Regarding it as an experiment, it may safely be recorded as resulting successfully. The lectures and discussions were attended by the students of the University, seventy or more in number, quite largely attended by the citizens of Champaign and vicinity, and there was a goodly number from various parts of the State. The lectures were, most of them, of an eminently practical character, and the discussions lively and interesting."

[CIRCULAR.]

ILLINOIS INDUSTRIAL UNIVERSITY,
Champaign, *December* 19, 1868.

The first annual course of agricultural lectures and discussions, instituted by the Illinois Industrial University, in Champaign, commencing Tuesday,

January 12th, 1869, and continuing during four days of that and the subsequent week, with three sessions in each day.

This is intended to be an annual gathering of the farmers of the State, and of their sons and daughters, for the purpose of discussing the best methods of agriculture; and it is earnestly hoped that all who desire to improve our tillage, our crops and our live stock, will be present and lend a helping hand.

No charge is made for admission. The University provides a hall properly warmed and lighted, and pays the expenses of the gentlemen who have kindly consented to open the discussions.

Each lecture, essay or "talk," will be followed by a discussion on the same subject, in which all are invited to participate.

Dr. John A. Warder, author of "American Pomology," will lecture daily from 4 to 5 P. M., on the subject of Fruit Culture.

Good boarding places can be had convenient, and at reasonable rates.

Railroads will be solicited to return persons in attendance at reduced rates.

J. M. GREGORY, *Regent.*

W. C. FLAGG, *Corresponding Secretary*

PROGRAMME.

TUESDAY, January 12th.

Morning, 9 o'clock. Introductory Address, Agricultural Facts and Theories.—Dr. J. M. Gregory.

Afternoon, 2 o'clock. The Natural Sciences and Agriculture.—Prof. W. F. Bliss.

Evening, 7 o'clock. Relation of Chemistry to Agriculture.—Prof. A. P. S. Stuart.

WEDNESDAY, January 13th.

Morning, 9 o'clock. Meteorology.—Prof. W. M. Baker.

Afternoon, 2 o'clock. The Soils of Illinois.—H. C. Freeman, of the State Geological Survey.

Evening, 7 o'clock. Management of Soils.—Dr. John A. Warder.

THURSDAY, January 14th.

Morning, 9 o'clock. Grass.—Dr. L. D. Morse, Editor Journal of Agriculture.

Afternoon, 2 o'clock. Corn.—M. L. Dunlap, Agricultural Correspondent Chicago Tribune.

Evening, 7 o'clock. Wheat.—W. C. Flagg.

FRIDAY, January 15th.

Morning, 9 o'clock. Potatoes.—Jonathan Periam, Superintendent Practical Agriculture.

Afternoon, 2 o'clock. Root Crops.—Jonathan Periam.

Evening, 7 o'clock.—Agricultural Book-keeping.—Capt. Ed. Snyder, Instructor in Book-keeping.

TUESDAY, January 19th.

Morning, 9 o'clock. Orchard Fruits.—Dr. E. S. Hull, of Alton.

Afternoon, 2 o'clock. Grapes.—Hon. Geo. Husmann, of Hermann, Mo.

Evening, 7 o'clock. Small Fruits.—Samuel Edwards, of Lamoille.

WEDNESDAY, January 20th.

Morning, 9 o'clock. Breeds of Cattle.—Sanford Howard, Secretary Michigan State Board of Agriculture.

Afternoon 2 o'clock. Horses.—Col. N. J. Colman, Editor Rural World.

Evening, 7 o'clock. Swine.—Hon. Elmer Baldwin.

THURSDAY, January 21st.

Morning, 9 o'clock. Sheep.—A. M. Garland, President Illinois Sheep Growers' Association.
Afternoon, 2 o'clock. Agricultural Botany.—Assistant Professor Thos. J. Burrill.
Evening, 7 o'clock. Vegetable Physiology and Economy.—John H. Tice, Secretary Missouri Board of Agriculture.

FRIDAY, January 22d.

Morning, 9 o'clock. Rural Economy and Rural Life.—Dr. J. M. Gregory.
Afternoon, 2 o'clock. Fences and Hedges.—Dr. John A. Warder.
Evening, 7 o'clock. Timber Growing.—O. B. Galusha.

FIRST DAY.

ADDRESS OF WELCOME: BY DR. J. M. GREGORY.

GENTLEMEN AND LADIES: It is my high privilege to-day to welcome you to the Industrial University to its first annual course of lectures. We inaugurate to-day a part of the plan of operations, contemplated from the outset, to extend the benefit of this university beyond the ordinary students who shall gather here, out into the fields of adult life and of actual labor. The university, in this movement, leaving for the moment its place near the gateways of practical life, where it sits to train those about to enter, and to fit them for life's great duties, seeks to go out into the very midst of the busy throng of labor, and mingle its counsels and lend its light to the struggling, toil and thought of the practical world. Not content to teach its science to the young, it also seeks to enlighten, with its learning, the labors and the lives of the grown men and women who are doing the world's great work and bearing the burden of its endless battles. Teaching to beginners the elements of science, it also desires to take part in the solution of the fresh problems which are always arising in the progress of practical affairs. If science has gathered any clear light from the study of the past, when can it be better displayed than in aiding to solve the questions which perplex the present, and in thus opening the clogged highways which lead to the future? Through these annual courses of lectures addressed to the actual cultivators of the soil, the university will mingle its voices with yours in the very midst of the farmers and fruit-growers of the State.

But thus while welcoming you to these lectures as learners, we do not forget that you come also as teachers, and we extend to you a double welcome as bringing to us, fresh from the great fields of practical life, the latest questions which have arisen there, and the latest and best experience which have been gained. Your assembling here will help us to give a still more practical character to our institutions, and your discussions will lend a new and real air and value to the sciences our pupils are studying. We have to thank you, therefore, as well as welcome you, for the aid thus lent by your presence here in giving to the university the "pre-eminently practical character" the Trustees desire it shall bear. It will be our study and pleasure to make your stay here as pleasant and profitable as possible, and we solicit your co-operation to give to this initial lecture session such interest and value that the Trustees may feel encouraged to repeat it in the successive years.

It has already been seriously proposed to hold other lecture sessions in *different* parts of the State; and, if sufficient encouragement is given that

the farmers and other citizens will attend, two such sessions, of three or four days each, will probably be held during this year—one in the northern and one in the southern part of the State. It is by this free and frequent interchange of views with the practical agriculturists of the State that the university hopes to work out one part of its great mission—the diffusion of agricultural science among mankind. Establishing some community of ideas between itself and the great classes in whose interest it works, it will be better able to organize its wide-reaching places of scientific observation and experiment, and will bring under its eyes the immense fields of research which it has undertaken to explore.

And, finally, we welcome you here that you may see for yourselves the work we are doing and are preparing to do for the cause of agriculture and the industrial education. We are confident you will say our plans are not one whit too broad to teach thoroughly those great and splendid branches of learning which relate to "agriculture and the mechanic arts;" and you will agree with us that no learning is too high to fit men to solve the great mysteries of seed and soil, and to master the mighty agencies of growth through which the brown earth is changed to golden grain, and pulpy fruit and fragrant flowers.

Again and heartily welcoming you, in the name of the university and of its faculty, I proceed to discuss the topic which has seemed to me a fitting one to open this course of lectures.

AGRICULTURAL FACTS AND THEORIES.

I regret that, for want of time, I shall be compelled to make this discussion in an extemporary form.

And in the first place, looking at the crude and disjointed facts which agricultural writers give us, we come to the conclusion that we have no *science of agriculture.* Botany is a science, because the facts which underlie it are established by fixed laws. Chemistry is a science for the same reason. But agriculture is not a science in any sense. It is simply a mass of *Empiricism.* If any one doubts this, let him attend the agricultural clubs and horticultural conventions, and he will be convinced. The ever recurring questions are still unsettled. One man has this experience, and another that, which is just the opposite.

One finds it most beneficial to plow his manure *under.* Another *top-dresses.* One plows in the *fall,* another in the spring. One *shortens back,* another leaves his trees to grow at pleasure.

But let it not be supposed that, in this statement of the present condition of agriculture, I, by any means, slander or underrate the value of the work already done. When I notice the change that has been wrought during this nineteenth century, and how far it is in advance of previous centuries in agricultural knowledge and practice in Northern Europe and England, and other parts of the world, we cannot too highly estimate the advancement made.

But after all, this advancement has been made in the way of experience. And we have nothing but experience. Hence we say, agricultural science is

empiricism, and not an established science. It may be best to define what we mean by *science*.

Knowledge is not necessarily science. A great mass of knowledge is not necessarily scientific.

A great many facts, gathered and classified so that they may be made available for use, do not make science.

Just as in medicine, a large amount of facts are known in regard to specific medicinal substances, yet this does not constitute science.

Science can only be founded when the actual scientific fact belonging to that department which this scientific truth proposes to investigate, shall have been referred to fundamental laws, by which this fact may be explained and out of whose operations they grow.

For ages there were no certain facts known about plants—respecting their forms, shapes, or their qualities. What were supposed to be facts had not been traced to elementary truths which conform to laws. There is no science about it.

For ages there was much known about chemistry, but there was no science of chemistry.

Beautiful *theories* were based upon the facts gathered, but no science. I repeat, therefore, a mere knowledge of facts, however extended, does not constitute science.

True science is built upon asserted facts which have been reduced to scientific shape. Everything accidental thrown off—facts referring to the established laws of nature—growing from them and explaining them.

Agriculture has not yet reached these facts.

Ten million busy hands are occupied in looking up these facts, which must be referred to invariable laws, that we may be able to direct the result.

Goldwin Smith gives this definition of science: "It enables us, from a knowledge of invariable laws, to predict from certain facts what other facts will follow." Now agriculture has not yet reached that state of advancement.

The question whether agriculture can rise to the claim of being a science is an important one. We think it can; but let us look at the means by which this must be done, if at all. Now there are two stages of growth in this direction.

The first stage is that of simple facts—the stage of close observation and close deductions from these observations.

Every science has passed through this stage. If we go back in history, we will find that all sciences once occupied just that position which is held by agriculture to-day.

Take Chemistry. There was a time when it was held that this world was made up of four elements—earth, air, fire and water; and upon these supposed facts theories were built up.

So Chemistry, as well as other sciences, has had its stage of close observation and close speculation upon these facts.

The second stage comes when all theories fail—when the foundations upon which we have built are swept away by larger experience—when we throw away all theories and come back to a careful and calm statement of facts—fearful to take any conclusions beyond the demonstrated fact, still patiently following up these facts with persevering inductive processes.

To explain further the nature of these operations, I ask your attention to the classification of the methods in which the mind operates in building up a science. All science is the growth of human intellect. Science does not lie written upon nature, but is the result of the operation of the human mind working upon these facts.

Now, how does the mind work? There are two processes.

One is called *Induction*—that process by which we are led into truth step by step, and no further.

The other process is called *Deduction*—that process by which we begin with assumed facts, or facts proven, and spread out from that and form growth.

Now these two processes lie the one over against the other. I am very solicitous to be understood upon this point, for it seems to me important that we come to understand these two processes.

The first method is by careful induction, like a man walking upon stones and feeling his way one step at a time, and going only so far as he can see where to place his foot and no farther, and thus ultimately reaching the law.

But there is another process which takes the law when established, or that takes some fact believed to be true, and makes to grow a whole upper growth of theories, or system of theories. Now neither of these is to be eulogized at the expense of the other; yet the period of induction is the period of progress—the period that throws away all theories and comes to measure fact with fact—lays one brick upon the other let the result be what it may; let the plan of the architects appear when the work is done. Now, taking these two stages of science, we determine the question: "Can there be any science of agriculture?"

Agriculture is both an art and a science. So far as it simply applies to practice in special rules directing to particular results, it is an art. I imagine that most men class it as an art.

But authority or usage permits us to class as sciences some branches of knowledge which are combinations of the facts of several sciences. Take, for instance, Geography. It takes from Botany the distribution of plants; it uses Geology, Meteorology, Zoology and other sciences to explain facts which belong appropriately to each, and not to Geography alone; yet we call Geography a science, because these several sciences combine together in the explanation of one single object—the world. While Geography has not single fact of its own, it gathers all these facts around one central object, and usage permits us to speak of Geography as a science. In this sense, agriculture, the great mother of arts—the all-sustaining, fundamental art—the art of

all arts—may claim to be a science. It combines many sciences on one common field—the field of animal and plant life.

Now let us see how science must grow. There is a distinction in facts which, it seems to me, the sooner we recognize and understand, the sooner will we advance to real science. There are common facts and scientific facts. A common fact is not necessarily a scientific fact.

What is a common fact? It is a fact which presents itself in our common observation or lies in our common observation of things. It is a common fact that many bodies, unsupported, fall to the ground. The real and essential character of the common fact may not be all comprehended. Thus the fact just mentioned was once so misunderstood and explained as would now seem absurd to us. For example, a philosopher of the middle ages undertook to explain the reason why a half dozen blocks would press harder downward than one block.

The blocks not occupying any wider space on the surface, being placed one upon the other, he could not see how it was that they pressed harder than one block. He did not suspect that any force was at work while the blocks lay at rest. His explanation of the fact was, that there was in the supporting body a certain sort of feeling or anticipation of the coming block, which aroused its resistance, and hence weight resulted.

But when statics became a science—when men came to understand that bodies press directly as the amount of matter, and inversely as the square of the distance—then the common fact became a scientific fact precisely stated. Many of the statements of Aristotle are to-day a laughing-stock for school boys. They simply take common facts and undertake to base upon them scientific deductions.

What is a scientific fact? It is simply a fact with all the husks stripped off—a fact from which has been eliminated the accidental, variable and non-essential, and there remains the essential and invariable.

The fact that all bodies have weight in proportion to the amount of matter and in the inverse ratio of the square of their distance from the earth, is a scientific fact; and upon this fact we safely base our deductions in physical science. In agriculture, facts seem to be settled; and we often proceed with our deductions based upon common facts, which are always fallible, having in them the same uncertainty and indefiniteness which belonged to the fact.

The trouble with agriculture is, as it has been with all the early sciences, that deductions begin too soon. It does not require much labor or ability to make loose deductions. Any mind with a little knowledge and some imagination can do this. None but well trained and thoroughly honest and clear minds will patiently confine themselves to induction.

Even Bacon, the founder of inductive philosophy—of which he has at least the credit—even Bacon, while he insisted on the necessity of not going beyond the facts of science, afterward presented one of the very worst instances of bad deductive reasoning. He did not follow out his own prescription at all. Aristotle proclaimed truth as clearly as Bacon did. But they both ad-

vanced too rapidly in their deductions, and propounded some of those absurd theories of which they stand convicted. Hence we say that it requires a patient and honest mind to be a good inductive philosopher.

It is said that Newton noticed the fall of an apple—but he did not draw all his deductions from the fall of the apple; he proceeded from this as a first step. The apple falls to the ground—then he proceeded to notice that other things fall, and that *all things* fall, that even the *smoke* falls whenever it enters a light medium.

Then he proceeded to inquire whether the planets are not falling, and whether it is not a scientific fact that all things fall or weigh directly in proportion to the matter they contain, and inversely as the square of the distance.

It was questioned whether the moon was not so far away that it will not fall. With the supposed facts respecting the weight and distance of the moon and planets he carefully proceeded to the solution of the problem. But it did not prove.

Now, a deductive philosopher, having the common fact, would have jumped at the conclusion and constructed the universe before Newton had his first scientific fact fairly proved.

But Newton did not take a single thing for granted. When he found that it did not prove—that the earth was not heavy enough to hold the world in its orbit—he laid aside his problem.

Others would have said, "It is true it does not quite work, but it is near enough;" and they would have held on to the conclusions half proven.

Afterward, when it was found that the geometers gave to the earth much larger dimensions, by seven hundred miles, than it was before supposed to have, Newton takes the new facts and proceeds carefully and surely to demonstrate his theory, which to this day is the received doctrine of science.

None but the best educated, none but the most honest minds will pursue the inductive process.

The great temptation is when men get two or three facts, they begin at once to build upon them.

I repeat: in deduction, theories which are built on common facts cannot be certainly well founded, and may not be worth the paper on which they are written. We can only build safely on scientific facts.

We have here, then, the *kind of facts* by which agricultural science may be built up—scientific facts. As yet, we have little else than theories built upon available experience. We are in the position of those who began, in the age of Newton, the study of astronomy, or of those who, in the age of Linnæus, began the study of botany; when the laws of the operation of the force pertaining to these sciences were imperfectly understood.

We to-day start with great vantage ground. We have facts and experiences which must lead to science. Agriculture is yet *Empiricism*, but it is doing the thing that will lead to success. We have learned, for example, that fertilizers do influence crops. We need not go back very far to find the time when the manure was utterly destroyed and cast out, as not only worth-

less, but it was even believed to be destructive to crops. But upon this point we have made advancement, and we have proved that these fertilizers do promote the growth of crops.

We need go back but a little while when deep plowing and thorough stirring of the soil were deemed necessary to promote growth. Hence, I repeat that with correct views upon these and other points, we start with great vantage ground over those who have preceded us.

What yet remains to be explored?

I think we need to determine the exact operation of the laws or facts controlling agriculture. We know that fertilizers, for example, promote plant growth. This is an established fact; but how they promote the growth of plants is not definitely settled. It is not determined whether fertilizers feed the plant directly, or help the plant to draw from the atmosphere the food it needs.

Now, what we want is to get this valuable process determined—to ascertain, if possible, how far it acts, if at all, conjointly with the sunlight and other agents in the soil, so that we may know just *how much* and *what* it does, and *how* it does it.

We need to attend, also, to the effect of the natural agents of Light, Heat and Moisture. We know that a potato grown out of the light will not have color. We know, also, that a plant without warmth and moisture will not germinate, and that a withdrawal of these will check the growth of plants; but the precise influence of these agents we do not know.

We need to make a more careful classification of the hostile forces which oppose the horticulturist and the agriculturist. And this leads me to say, finally, that the greater and more difficult work remains to be done. We need to understand the character and habits of our insect enemies, that we may protect ourselves against their ravages. There are unfavorable conditions in regard to heat and cold which neeed to be understood that we may fortify ourselves against danger. So in the animal world, we need to understand the precise character of the diseases that attack our animals—and these need to be so carefully ascertained that they become *scientific facts*.

I trust that the day is not distant when we shall have something more than *experimental* science—a science settled down upon the laws of nature, and which shall predict the result and reach conclusions with the certainty of mathematical test.

It is not to be supposed that any art can reach that degree of attainment of the *hand* that guides it. The *art* will always lag in the rear. Science must go before. It says, " thus far shalt thou come and no farther. This is the way—walk ye in it."

So, agricultural science must go before and mark the place where lies possible culture.

FRUIT CULTURE.

INTRODUCTORY LECTURE BY DR. JOHN A. WARDER, OF CINCINNATI.

In standing before you here to-day, I feel that we are stepping upon the threshhold of a new era, toward which some of us have been looking most anxiously for nearly a quarter of a century. Several of the noble citizens who first bestirred themselves upon the great subject of *Industrial Education* are still among us. The influence of their generous efforts has been felt by thousands, of whom many are here present to witness the results of their efforts in our Industrial University.

To them, to these, and to the great public, whom we hope to see deeply interested in the great problem of practical education, a few words may be addressed by one who has long been deeply interested in the subject; who, as a father, has again and again revolved the important question, How shall we best educate our sons and our daughters for the great business of life which lies before them? He hopes that his utterances will be received in the kind spirit which actuates him in presenting them.

Practical Education seems to be a very simple expression, and yet how few of us will agree as to what it shall mean! One may say that it is that education which comes through the fingers, rather than by the means of any of the other senses. It is that which we may learn by absolute practice while we are engaged in our daily work—that surely is practical enough. But it is not enough to satisfy some of us who desire to cultivate all the senses as well as that of touch, and the control of our voluntary muscles.

Others may claim for practical education, that it shall consist only in the instruction of the pupils in that kind of knowledge which will be of every day use, and they would eschew or condemn everything beyond this—alas! what limited ideas of this great desideratum that has exercised the thoughts of some of our greatest minds!

Some would teach mathematics only, as applicable to the various arts, while others will claim the supremacy of languages as the best method of developing the mental powers which are to be the means of improving all the arts.

We have writers who understand the subject, who have given it their serious and studious attention, who know that whereof they affirm, when they give us, as their ultimatum, that it is necessary to educate the whole man in all his faculties to produce the perfect result.

To this proposition we must all agree; still, we demand *practical education;* and properly so, for it is clear that very few of us can ever by any possibility have the time, the patience, or the opportunity to become *perfectly educated.*

If asked to give a solution of this great problem, and to indicate how the important advances of science may be brought to aid the various arts of life and reduced to the comprehension of those who intend to apply themselves to these several pursuits, in the great business of the world, I should with diffidence suggest that the greatest possible amount of good might be done, by inviting sensible and practical men, who are well posted in their special

callings, and having them teach the classes—at the same time throw open the doors widely to all applicants for instruction, of whatever age or sex, and give them free choice in the selection of the studies they would pursue Make the institution a university in fact, with its schools of chemistry, of physics, of mathematics, of botany, of geology, of zoology, and especially of mechanics and of agriculture.

The author of the act of Congress, by which this noble grant has been provided, seems to have similar views. Though a son of the pine tree State, on our farthest eastern boundary, Mr. Morrill appears to have caught the true spirit of our prairie call for *Industrial Education*, and to have fully appreciated the very general desire manifested in other parts of the country for the establishment of institutions for practical instruction, which, it was fondly hoped, would supply the want that could not be satisfied by the classical colleges of the country as they were generally conducted.

Mr. Morrill assured me that if the States which accepted the grant made a misapplication of the endowment, they would be held responsible for the result. In his bill it is decreed that the tuition fund derived from the sale of the land shall forever be appropriated to the support of schools for instruction in *agriculture and the mechanic arts*, from which (it was added as a legislative fence-rider), that the languages should not be excluded, and that military tactics should be taught.

One after another, all of the sciences, chemistry, physics, and especially mathematics, will each claim a prominent place in a course of study that may be devised to carry out the spirit of the enactment of Congress; but, the truth must be admitted—we none of us know what we really want, what we need, what we can do, nor what we cannot do. A great experiment is before us awaiting its solution—we are setting out to build up from nothing, these great *schools of science*, schools *of applied science*, as Professor Gilman calls them—there are no well considered, nor well digested plans—there are no well prepared, well drilled classes to receive our instruction—and worse than all, there are few or no well qualified teachers for these schools of applied science. The very absence of such school has made us two great orders of men: those who know only in the way of theory, and those who know only in practice. From either of these two orders we are forced to draw our teachers, and eventually, we hope to find the right men for the right places. It may be only after repeated siftings; therefore, my friends, your kind patience is craved on behalf of the devoted men who have nobly acted as trustees for this institution, next on behalf of us, their agents, who have the honor of being their appointees in the important position of teachers of the classes, whom your Legislature, in its wisdom, has directed to our walls.

Be gentle in your criticisms, and be just in your decisions; remember that our cause is an experiment, and that if it should not fully meet the wants of the people, your excellent board of trustees have it in their power to introduce such modifications as may appear to be necessary.

And now I beg your patience for a few moments, on my own behalf. When *I accepted* the honorable appointment of lecturer in this institution, it was

with diffidence in my own ability to fill the station as we all wish to see it filled.

To some of you, who favor me with your presence, it will seem as though nothing new was advanced in these lectures. Certainly nothing but well established truths will be taught. To some of you, my seniors in horticulture, these things are already familiar—but it is safest for a teacher to adopt the theory of the absolute ignorance of his class. This will induce and require him to descend to the most trifling minutiæ, which may weary the adept, but they are all important to the novice. The course proposed for these lectures is planned upon this proposition.

Upon the present occasion I propose to occupy your attention with a few general remarks upon the following questions:

Why do not all of our farmers have plenty of fruit?

Why should all who live in the country grow fruit crops, just as they now produce grain, grass, and live stock?

The first question may be answered very readily, for most of those who have no fruits; it is simply because they do not try to have them, and this is the very natural result of their ignorance of the means of obtaining an abundance of these blessings upon almost every farm in the United States.

The latter question may be answered by enumerating some of the great advantages of fruit growing. These are primarily the *health* of the families of the producers, where fruits are freely consumed upon the table at all seasons of the year; next, the *pleasure* attendant upon their propagation, their culture, and above all, the satisfaction derived from the harvesting and consumption of these products.

It is a well established axiom in the medical profession, that the regular consumption of fresh, well ripened fruit, is conducive to health, and it is also a fact, that the* farmers of our country are not so *well fed* as they should be. This is nobody's fault but their own. True, they cannot have so great a variety of meats as those who reside in towns and villages, but they may enjoy the greatest profusion of fresh vegetables, and a succession of ripe fruits the year round, if they will but choose to take the trouble to plant and cultivate even a small portion of their land as a garden and orchard.

An appeal on behalf of fruit culture may also be made to the more sordid motive of money-making. No crops that are produced from the soil yield so great profits. The productiveness of small pieces of land appropriated to fruit culture is truly wonderful, and the money results in some cases are so great as to be worthy of the fashionable term of "fabulous."

It is well for the farmer to recollect that some of our fruit crops may be consumed with great advantage and profit by his stock animals. Hogs, sheep, cattle, particularly milch cows, and even horses, may be profitably fed upon some varieties of fruit. It has been asserted by a recent author, that "fruits of all kinds, but particularly what may be called the large fruits, such as are grown in our orchards, may be profitably cultivated for feeding our domestic animals. Sweet apples have been especially recommended for fattening swine, and when fed to cows they increase the flow of milk, or pro-

See Dr. Flint's *Contributions*; published for the U. S. Sanitary Commission, pp. 18—[illegible].

duce fat, according to the condition of these animals. * * * Orchards have been planted with a succession of sweet apples that will sustain swine in a condition of perfect health, growing and fattening simultaneously from June to November; and the late varieties may be cheaply preserved for feeding stock of all kinds during the winter." The farmer may also be reminded that portions of many farms can be appropriated to the culture of fruits, which are not adapted to crops that require cultivation on arable land. It has even been asserted that a given area planted with fruit trees, will sustain more stock, or fatten more pork, than the same space devoted to grain and forage crops.

I propose to present some facts which will overcome the admitted ignorance referred to in the answer to the first query, Why do not farmers have fruits? In other words, briefly to point out, as a result of long experience and extended observation, *what plants to get, and how to set and tend them.*

The leading classes of fruits will be presented in the order of their importance:

THE APPLE, prince of fruits, will first claim our attention. There is scarcely a farm in the United States where it will not grow, and where some of its very numerous varieties will not succeed. In the extreme north, it may be necessary to resort to varieties of the most hardy character, such as the Siberian, and some other of Russian origin. In the south, many new varieties have originated from seed, which appear well adapted to that region.

Preparation of the soil—Disappointment from bad selections.—Having assigned a portion of the farm to the apple orchard, which sho ld be elevated, and of a light, porous soil, the ground should be well prepared by thorough plowing, if this be practicable, though it is found that fruit trees will thrive in newly cleared land, if set among the stumps; they have been planted on prairie sod, and there are many fine orchards on rocky tracts, where the preparation must be done exclusively with the pick, the spade, and the shovel. It may be the best economy for the owner of such land to appropriate it to the orchard, because it is unfitted for tillage crops. Even the holes for setting the trees may be made with the plow, by simply marking out the surface at the proper distances, and setting the trees at the intersections. This is done after the whole ground has been well prepared by a thorough plowing, and the trees are easily planted in the mellow soil, in which they will thrive admirably. On low and flat lands that have no good natural drainage, tile should be used, if accessible, but even here surface draining may be done with the plow, by throwing the furrows together where the rows of trees are to be set, what the farmers call back-furrowing, two or three times, so as to make a little ridge to plant them on. This will also make open furrows between the rows, that will give outlet for the surplus rain water, or at least lead it away from immediate contact with the roots.

Selection of Trees—Varieties.—Young trees are better for planting than older ones; small ones are more easily handled, and are surer to grow than larger ones. Two years from the graft or bud is long enough for the apple to remain in the nursery. This is true of most varieties, but there are

exceptions to this, for some slow growing kinds require a longer period to attain sufficient size. The plants should be stocky and branched, and they should be taken up carefully, so as to preserve the roots.

Varieties are so numerous, and tastes so diverse, that it is almost impossible to make out a list of sorts that will be acceptable to all, and besides this it is well known that the varieties which succeed in one locality may fail in another. Every planter should endeavor to ascertain what sorts have been tested and approved in his own neighborhood. Hardy and productive kinds, of second quality, are more satisfactory than those fruits of greater excellence, which have not these prime qualities of the tree. It is rare that we find all excellence united in one individual.

For the family orchard it is best to have a succession in the time of ripening. The same is true of an orchard planted for stock-feeding. But in the commercial orchard, where a large quantity of fruit is to be produced for shipping, it is found best to plant only a few varieties, and these should be productive, hardy and of such a character as to bear transportation and to command a ready market, less regard being had to the superior quality as table fruits than in the amateur and family list.

APPLE FAMILY—JUNE TO MAY.

Summer Rose, Primate, High-top Sweet or Red Astrachan, Benoni, Summer Queen, Golden Sweet, Jefferies, Maiden's Blush, Lowell, Rambo, Wagner, Western Beauty, Jonathan, White Pippin, Ohio Pippin, Grimes' Golden, Winesap, Raule's Janet.

Planting.—After the ground has been prepared, it is ready to mark off with the plow in two directions, so that the intersections of the furrows shall come at the stations for the trees. This is the best way to dig the holes, for the furrows may be made quite deep enough. Indeed, it is not desirable to set the trees deeply—some even advocate planting on the surface and covering the roots with a little mound of soil, as is done when the trees are set on top of the sod of prairie or meadow. The distance between the trees will depend upon the habit of the variety. Some will require more space than others, but close planting has many advocates, who advance some cogent reasons for crowding the trees instead of the wide planting of former years. A few of these may be mentioned: In the first place, it is now conceded that the land appropriated to the orchard should be given up to the trees and not be used for other crops; therefore there is less necessity for space between them. In close planting the whole ground is shaded and kept from the baking influence of the sun, and thus remains more loose and friable than where exposed. The crowding of the trees also protects them, in a great degree, from the severity of the cold in winter, and from the injury incident to the sudden changes of our climate; but in exposed situations, this close planting especially shelters them from the trying winds.

The planting should always be done with the greatest care; the roots should be spread out in their natural position, the finest soil put next to the fibres and worked in among them with the fingers, so as to be in immediate contact both below and above them. When the roots are well covered, slight

pressure may be made with the foot, especially toward the end of the roots; or, if the ground be dry, a few quarts of water may be poured upon it to settle the soil, and this should be covered with more dry earth. All that portion of the tree which was under ground in the nursery must be covered, and, in fall planting, a little mound should be heaped up against the stem to keep it from being swayed by the wind, as well as to turn off the rains from the roots. This mound may be removed in the spring.

Cultivation should be thoroughly kept up in the young orchard for a few years; and, at first, hoed crops, such as corn or potatoes, may be allowed among the trees, but no grain or grass, nor any weeds, should ever be permitted among them. This cultivation may be continued four or five years, until the trees are well established and begin to cover the ground with their shade, when the spaces between them will be so occupied by their branches as no longer to admit the horse and plow. The land may now be laid down to clover—not for a hay crop, but simply to cover the surface as a mulch, for which purpose it may be mowed and left on the ground.

Training and Pruning.—These topics should be considered together, since both have the same object—the forming of the head. The tree should be trimmed early in its orchard life, so as to produce the desired shape. It should be branched low, from two to four feet from the ground. The main limbs should be well balanced and well separated, while the leader must also be preserved; all interfering branches should be removed, and those which are too strong must be shortened in during the summer. All this will require some care and watchfulness, but will need the removal of very little wood if it be done in time, while the tree is small, and this is the best time to do the work of pruning Midsummer is the best season; a strong, sharp knife and a pruning chisel, the best instruments.

Pruning old orchards is quite another affair; and if they have been long neglected, the trees may need a very severe pruning to remove crowded, exhausted and decaying branches, in order to re-invigorate the organism by the production of new wood growth. The application of the saw will now be required, and the mild weather of fall, winter or early spring should be selected for doing the work. All large wounds must be pared smoothly with the chisel, and covered with some mastic to exclude the elements. In such trees it is sometimes better to thin out the branches and shorten them than to remove the larger limbs.

PEARS are delicious fruits, and every farmer should plant at least a few trees. The crops are certain and any surplus may readily be disposed of. The old saw about planting "for one's heirs" must give way before the advances of pomology, for we now have many varieties in cultivation that are early-productive, and modern horticulture has furnished us with means of forcing early fruitage upon those varieties that formerly tried the patience of the orchardist by their long continued wood-growth before reaching that condition of maturity that is attended by abundant crops.

The natural season for the maturing of this fruit being mid-autumn, we find, as a result of cultivation and the production of new varieties, that this period

has been considerably extended in both directions, so that the pear season now reaches from July to March, or even longer. A very experienced student and propagator of this fruit has suggested that in thus departing from the normal season of ripening we may expect to find, under the law of compensation, that we shall lose some desirable qualities. The truth of this is a matter of common observation; thus, in quality, most early pears are inferior to those of a later period, and the general inferiority of the latest or winter pears is a matter of common remark. There are exceptions in both extremes, but autumn is the season of the best pears.

Soil.—Any good loamy land, with a predominance of clay, will produce good pear trees, and thorough plowing will be a sufficient preparation after draining, if the subsoil be tenacious and wet. The pear strikes its roots deeply into the soil; it is thus able to seek its food, and it is a gross feeder, but may thrive even on thin soils—at the same time it will be benefited by suitable manures. Analysis of its products shows that it needs lime and phosphoric acid; therefore, bones may be applied with advantage to lands that are deficient in these elements. Planting and cultivation of the pear may be the same as that advised for the apple.

Dwarf pears have been very highly recommended and largely planted; but the majority of planters now prefer to have their trees on free-stocks. These are often erroneously called *standards* in contradistinction to those being dwarfed by being worked on quince stocks. The dwarfs are very satisfactory for limited grounds, and should have high culture and good care in trimming and training to produce their best results. The two styles of trees should not be planted together, as has been advised; they require different treatment.

Training.—Pear trees will bear crowding, as most of them are of an upright habit; fifteen or twenty feet apart is wide enough for the majority, and many will succeed much closer. The trees should not be grown as *standards*, with tall, naked stems, but do much better if trained from the first in conical form, when they are generally called *pyramids*. This object is attained by causing them to branch low, and by curbing the upper limbs at both the summer and winter pruning, thinning them out and shortening them in such a manner as to keep the lower branches always the longest; the result will be the desired conical tree, which shall have all of its twigs, fruit and foliage well exposed to the sun and air.

Culture and Pruning.—The pear orchards may be treated like those of the apple, excepting that the general habit of the former is pyramidal and of the latter globular, so that the pruning will require some modification, though conducted upon the same principles. While young, the ground among the trees should be well cultivated, but after they have attained some size (after six or eight years) they are found to do better in grass than if the cultivation be continued. These remarks apply to the pear upon free-stalks, but those trees that are dwarfed upon the quince or by severe and continued root-pruning will require high culture and even manure.

A select list of pears for family use from June till December:

Windsor, Early Butter, Doyenne d'Eté, Rostiezer, Tyson, Dearborn, d'Amalis, Bartlett, Flemish Beauty, Golden Butter, Autumn Melting, Sheldon, Duchesse, Beurre Diel, Figue, Vicar, Pass Colmar.

PEACHES are always acceptable, easily grown, and they come into fruiting at an early age, generally the third year. Unfortunately they are not constant bearers, as the flower buds are often injured by the severity of winter or by spring frosts. Peach trees will grow on almost any soil, but light sandy or gravelly lands and elevated situations seem best adapted to them. The trees should be one year old from the bud, cut back to a bare stem, about two feet long, before planting. They should be set from fifteen to twenty feet apart in the orchard, planted in the spring, and the ground must be cultivated continually to secure the best results. Mounding the tree has been advocated, but it is an expensive operation, the merits of which have not yet been fully demonstrated. There is a great variety, both in its color, flavor, consistence and season. There are clings and free-stones of all colors. The former are the best, the latter are most popular. The season extends from the first of August until the middle of October in this latitude. Those which ripen earlier or later are of less value.

The following lists are given under their classification:

FREE-STONES.

White-fleshed.—Early Tillotson, Early York, Hale's Early, Large Early York, Morris' Red, Old Mixon, President, Red Rareripe, Stump the World, Ward's Late.

Yellow-fleshed.—Barnard, Bergens, Columbia, Crawford's Early, Crawford's Late, Red Cheeked Melocoton, Smock, Yellow Rareripe.

CLING-STONES.

White-fleshed.—Baltimore Rose, Grand Admirable, Heath Cling, Large White, Old Mixon, Rodman's Red.

Yellow-fleshed.—Lemon Cling, Orange Cling, Tippecanoe, Washington.

Deep Red Flesh.—Blood Cling or Claret, Blood Free.

THE PLUM is so sadly affected by the Curculio, that few of us know how excellent a fruit this is. Occasionally the rascals stand back, and thus we get a crop, and some cultivators have succeeded in counter-working the enemy so as to preserve their fruit. Trees planted in trodden places near houses have escaped the attacks of these insects, and have borne crops for many years, so that farmers are urged to continue planting plum trees in such situations. There are some varieties, however, which appear to escape these invaders, among them the little Damson, which is well worth cultivating, as it makes good preserves.

The following select list is recommended for those who would plant plums:

Early Orleans, Lombard, Green Gage, Prince's Imperial, Reine Claude de Bavay, Yellow Gage, Washington, Coe's Golden, Smith's Orleans, Damson.

CHERRIES.—This delicious fruit appears to be more fastidious as to soil than any other, for though it will grow almost anywhere, it does not stand well on our rich limestone lands. Those soils that are natural to the chestnut appear to be the most suitable for cherries.

There are some very hardy varieties that seem to do equally well on any ıd of land ; these are called the *Dukes* and *Morellos*. They are mostly sour l are chiefly valuable for cooking cherries. May be planted ten, fifteen or enty feet apart, according to their class, as Morellos, Dukes, or Hearts and garreaus, the last being the largest. The trees should not be too old when nted—two or three years from the bud or graft is enough. They should headed back so as to branch low, and should be grown as pyramids. All pruning should be done while they are young, as they do not readily heal r the stump of a large limb. These trees are very apt to split and burst ir bark, especially where the stems are exposed to the sun by trimming m up as standards, hence the importance of low heads. This accident is st common in the free growing kinds and in rich soils.

The following varieties are worthy of culture :

art Cherries.—American Heart, Governor Wood, Black Tartarian, Coe's Transparent, Doc- Purple Guigne, Black Hawk, Black Heart, Burr's Seedling.

ukes.—May Duke, Belle de Choisy, Belle Magnifique, Carnation, Louis Phillippe.

garreaus.—Elton, Cleveland, Rocheport, Yellow Spanish.

rellos.—Common. Early May, English, Kentish, Early Richmond.

UINCES have been too much overlooked by our farmers, who could not sent their families with a more acceptable offering than the fruit from a trees planted in some low spot of rich, moist soil, such as that which eives the slops and drainage from the dwelling house.

These trees are rather hardy and will occupy little space, as they never w large, and can be planted eight or ten feet apart. They should be ined to one stem, branched about three or four feet from the ground, and t trimmed to open heads. The common variety is the *Orange*, which ens in September, while peaches abound. The *Portugal*, or pear-shaped, l the *Angers* have smaller fruits, which ripen later—in all October. The gest fruit is *Rea's Mammoth* or *Coxsackie*, recently introduced and very hly recommended.

RAPES.—Every farmer, every cottager, every householder or houseruler uld plant a few grape vines. It is a very simple affair, requiring no great unt of skill nor labor to plant, train and trim a grape vine, and its pro- tiveness of fruits, that every body, young or old, can appreciate, is prover- l. Who has not heard of the famous grape cure? Who can object to ng it? Certainly not he who has planted and trained his own vines.

Almost any soil that has been deeply loosened and moderately enriched l cause the grape vine to grow luxuriantly. It may be set in out-of-the- places, trained to a stake or a trellis, or be made to climb beside the ls of out-houses and cover their bare sides with foliage and fruit, render- them ornamental instead of ugly.

Training the young vines in an upright direction to encourage their growth, at the same time concentrating their force into one or two shoots by ching or rubbing out the others, is a very simple affair and light labor. ning them when dormant, cutting them back to two or three eyes in the or winter, is no great mystery. The same process of training two strong ots the next season is but a repetition of the first summer's experience, with

mor satisfactory results; and the second fall, with canes nearly as large as the little finger, the pruning is less severe, because we now have bearing wood, which needs to be shortened-in two or three feet in a strong vine. These canes are to be trained horizontally, as the arms of the vine, in which condition they may be left for years, unless they need renewal. In the third and all succeeding years, we must still train the shoots upward, taking care only to remove the superabundance of the growths, by rubbing out early in the season and leaving one shoot, say, every nine inches, which must be trained upward. In the fall of this year we commence pruning these shoots for alternate production of fruit and wood, by cutting one cane about two feet long and reducing the next, the weaker, to a spur with only two eyes or buds. In this way, the bearing wood of the vine is constantly renewed. The mystery disappears when we recollect that all the fruit of the grape vine is produced upon green shoots that grow from the cane of last year's growth. By renewing these shoots annually from below, we can have bearing wood to cover the trellis, and strong new shoots to clothe the whole with abundant foliage. Various modifications of pruning and training have been suggested and may be practiced, but the most simple, common and successful is the one indicated above. All depend upon the annual reproduction of new wood from which to draw our supplies of wood from year to year.

In the multitude of grapes that are now offered to the public, almost any tastes may be gratified, and yet for the most satisfactory, because certain results, we are safe in selecting a few well known varieties that we can recommend to our farmer friends:

Hardy and productive—Concord, Hartford, Ives, Clinton, Martha (white).

Not always healthy—Creveling (very good), and Catawba.

Juicy grapes, very best—Delaware, Iona, Israclla, Isabella, Diana, Herbemont, Alvey, Elsinboro.

SMALL FRUITS.

We now come to the consideration of the *small fruits*, which, however, may constitute a very large share of the food, comfort and luxury of a well regulated family, either in the country or city, and which will contribute in no small degree to the healthiness of the people, by substituting their grateful acids and sweets for the calomel, ipecac, tartar, soda and potash, in various forms, that are so freely drawn from the druggist's shelves, either for the cure or production of disease, according as they are administered by the doctor, or by the cooks.

The Strawberry comes first in the order of the season, and indeed it is the most univesally welcomed and relished of them all. The cultivation of this fruit is so simple, and the returns so speedy and so grateful, that it should occupy a prominent place in every farmer's garden. This fruit will grow in almost any soil, but a good stiff loam, well stirred, is probably the best. The strawberry plants should be well rooted runners, or offshoots from an older plantation; they should be taken up carefully, so as to have good roots. If these have been formed in small flower-pots sunk near the parent bed, so much the better, as the fibres, being confined by the pot, will be less disturbed in transplanting—or the ball may be set entire.

Strawberries may be grown in hills, in rows, or in beds. The latter is the common method, and the beds are formed by planting two or more rows a foot or fifteen inches apart, setting the plants twelve inches one from another in the rows. In the beds, the runners are allowed to grow, and to increase the number of plants indefinitely, so that they are often injured by being crowded too closely together. When planted in hills, they are set eighteen inches apart; the space between them is kept perfectly clean, and the runners are cut as soon as they appear. This results in the greater growth of the original plant, which has an increased number of crowns from which the blossoms and fruit proceed in great numbers. This method enables the producer to have the best possible results in the size and appearance of his fruit, but it is attended with more labor and expense than the bed system. Many cultivators prefer planting in rows, when they set the strawberries about a foot apart, and place the rows two feet or more one from another, according as they expect to use plows or hoes in their culture. In the narrow rows the runners may be cut off, and the fruit will be almost as fine as that grown in the hills, but in the wider rows the runners are generally allowed to strike root, and spread the row into a bed in the course of the first summer after planting.

Spring is the best time for setting out the plants, though this may be done at any time during the growing season. The advantages of early planting are the longer period allowed for the stools to grow and become thoroughly established in the soil. The plants are set by the line, a hollow is opened with the trowel, in this the roots are spread out, then covered with mellow earth and pressed firmly with the fist or even with the heel. If watered at once, a little fresh earth should be thrown in to prevent the cracking, but great care must be taken to avoid placing the crown below the surface of the ground—in other words, the roots must be planted and not the corm, from which the crowns arise. Thorough culture should be given through the season.

Mulching, with old rotten manure, applied after planting, will encourage the growth of strawberries, and keep the soil moist. Winter mulching with clear straw, leaves or other material, should be liberally applied after the ground has frozen, and be left to protect the buds during the winter, and to be removed from the crowns of the plants in the spring. Being left between the rows, the straw will make a good summer mulch, and keep the fruit clean. In hill culture, saw dust and old tan bark have been recommended, and still another material, spent hops from the brewery, has been used with excellent effect.

Strawberries have a peculiarity in their blossoms, from which they have been classified as *Pistillates*, *Staminates* and *Hermaphrodites*. In the first class, the stamens are so defective that the flowers need the fertilizing influence of other kinds, which must be planted near them. These furnish many of our favorite varieties, especially those which are largely cultivated in beds. The next class embraces most of those sorts which produce the largest berries; their flowers are often so deficient in the pistils that a large per centage of them fail to set fruit. This is particularly the case when these varieties

are grown in beds and allowed to multiply their runners. They are, however, quite productive when cultivated in hills, and they have formed branching crowns from which spring numerous trusses of flowers. Besides these two classes there is another, in which the two sexes are so evenly combined that almost every flower is followed by perfect fruit. A very few varieties of the strawberry either cultivated or wild belong to this group. These different classes will be indicated in the list by the letters P. S. and H.

Agriculturist, H.; Austin, S.; Burr's New Pine, P.; Dr. Nicaise, S.; Extra Red, P.; Fillmore, P.: Golden Seeded, S.; Hovey's Seedling, P.; Jucunda, S.; Longworth's Prolific, H.; Necked Pine, P.; Russell, P.; Superior, P.; Triomphe de Gand, S.; Victoria, S.; Washington S.; Wilson's Albany, H.

RASPBERRIES.—Next to the strawberry, and nearly allied to it in its botanical relations, is the Raspberry, which furnishes a fruit of high flavor and exquisite fragrance. It is no wonder that this should be a favorite with all fruit growers, since it is easily produced, hardy, makes quick returns, is easily gathered, and commands a ready sale at high prices. And yet it is equally surprising that so few farmers' gardens are stocked with the raspberry.

Every soil that is cultivable will produce this fruit, but a good loam is best adapted to it. The only preparation requisite, is ordinary plowing of the land, but deep cultivation and manuring are well bestowed upon the raspberry patch, and it should be kept clean by thorough summer cultivation.

The raspberry may be planted in the fall, but the early spring is generally preferred. They may be set about three feet apart, in rows that are from six to nine feet wide, or planted in hills five by five feet, or wider for some of the larger kinds. Planting in rows is usually preferred, but the hills allow of cultivation in both directions, or cross plowing, which saves hoeing, and also permits the pickers to get among the plants more readily.

Trimming the raspberry was formerly done only in the winter, and consisted in shortening the canes, and removing the old dead wood, and the surplus feeble shoots, so as to leave from two to four on each plant or hill. This was done at any mild time between October and February or March. Fall pruning, if done too early, may prove very injurious, if followed by mild growing weather that causes the buds to grow, and thus destroys a portion of the next year's crop. Of course, it is understood that all the varieties and species of this genus, *Rubus*, including the raspberry and blackberry, produce shoots one year that become the bearing canes of the next summer, and then die; an apparent exception exists in the autumnal bearing raspberries, which produce blossoms and fruits upon the shoots the season of their growth.

Summer pruning is now practiced by all good cultivators. This is a very simple operation, and consists in pinching or cutting off the shoots as soon as they are two feet high, which causes them to branch out with strong laterals, and these are to be cut back according to their strength, in the winter. By this means the plants are made more stocky and bushy; they resemble little trees, and are able to bear enormous crops. At the same time, all redundant branch shoots are to be cut away. This method also obviates the necessity for any

cind of support, such as stakes or trellis, since the sturdy plants are able to tand alone.

We have two American species of eatable raspberries, the *Strigosus* or red ruited, and the *Occidentalis*, or thimble berry, the black caps. Besides these, he European species, the *Idæus*, furnishes many delicious raspberries, most f which are tender and need winter protection:

Black Caps.—Thornless, Doolittle. Miami, Purple Cane.
American Reds.—"Red Antwerp," Kirtland, Clarke, Philadelphia.
Foreign.—Red Antwerp (true), Brinkle, Hornet, Pilate, Franconia, Naomi (new).

BLACKBERRIES.—The blackberry, though abounding in most parts of the ountry, is entirely deserving of care and cultivation. In the garden it is nder our control, and may be allowed to reach perfection, by hanging until erfectly ripe, which is not the case that must be yielded to the "eminent omain" of any vagabonds who may come along and trespass on our farmers, nd glean the fruit from our neglected fields and fence-corners.

Any rich, deep soil, well plowed, will suit this fruit. The plants should be llowed plenty of room, and may be set every four feet, in rows eight or ten eet wide. The ground should be well cultivated, or deeply mulched, and he suckers must be kept down, by cutting them with the hoe whenever they ppear between the rows, and these should not be crowded—one stalk every wo feet will be sufficient. This being only another species of the genus *Rubus*, or bramble, the remarks as to the habit, and pruning of the raspberry are applicable to this species, and need not be repeated, except that the ummer pruning should be practiced a little higher, say from three to four eet, according to the vigor of the plants, and the redundant shoots must be ut off.

Black.—Dorchester, Thornless, New Rochelle, Wilson, Kitatinny, Missouri Mammoth.
Light colored.—Crystal (white), Orange (rose).

THE CURRANT.—In almost every log cabin garden we used to find this ealth-giving fruit, which offers its agreeable acid in the heats of summer as n antidote or preventive of the billious effects of our torrid season. And et the currant is a sadly neglected fruit, and in many parts of the country here is not enough for home consumption.

This being a northern plant, it is thankful for a partial shade or protection rom the scorching sunshine (in latitude forty or southward). For this object it is well to plant the bushes on the north side of a fence or building, nd even in the shade of young orchard trees, where they sometimes succeed ery well for a long period, even after the apple trees have occupied and haded the whole surface.

The currant delights in a deep, rich loam, and will thrive even where the oil is somewhat moist. The bushes should not be crowded, as they require bout four feet space, each way.

Trimming is to be done in the fall or winter, as the buds swell very early n the spring. It should consist in shortening two or three of the strongest oung shoots, cutting away all the weaker ones, and removing only the oldest nd exhausted bearing wood. Unlike the raspberry, currants do not fruit on

the young shoots, but upon little spurs that appear only on branches that are two or more years old.

The plantation must be kept clean, and free from grass and weeds. After cultivation in the spring, it is a very good plan to cover the soil with a heavy coating of old hay, straw, fodder, leaves, or other suitable mulching material, which will retain the moisture, and preserve the fruit a long while in fine condition.

VARIETIES.—Common Red, Red Dutch, White Dutch, White Grape, Versailles, Cherry, Black Naples.

GOOSEBERRIES.—Fashion has wonderfully affected the production of this fruit. The fine, large, English varieties were generally so badly affected with a mildew, that their culture was abandoned, except by a few fortunate persons. The introduction of the Houghton, and American red varieties, worked a revolution—everybody planted them, and everybody purchased them at high prices for several years; when lo! the cost of sugar caused a change, and the demand fell off to such an extent that the plantations were rooted up, and there was no longer any sale for the plants, and nurserymen discontinued their propagation. Gooseberries are just as valuable, nevertheless, to the farmer's family as ever they were, and their cultivation is so simple that they may and should be grown in every household garden, and by every cottage.

RELATION OF CHEMISTRY TO AGRICULTURE.

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In attempting to trace the relation of chemistry to agriculture, it may be well to inquire, first, what chemistry is, and, secondly, what agriculture is. Briefly, then, chemistry is the science of the elements. It isolates them, and teaches us their properties, their mutual relations and affinities, the changes which they undergo under different conditions, and the new bodies formed when two or more of them combine, by the action of chemical force. These elements and their compounds, which are infinite in number and in the variety of their forms and properties, their mutual relations, and the changes which they uudergo by their reactions on each other in the inorganic and the organic kingdoms, constitute the field of chemistry.

Secondly, what is Agriculture? It may be looked at from two points of view. It may be considered either a science or an art, and both, as yet, in an imperfect state. As a science, it is concerned with the conditions and laws of vegetable growth; as an art, it is, or should be the practical application of the science, in such a way as to obtain the most abundant harvests. In a broader sense, it includes also the raising of some or of all kinds of domestic animals, and in this respect chemistry sustains a most important relation to agriculture; but for our own purpose we shall not consider this view, but confine ourselves to the relation of chemistry to agriculture as a means of raising the best crops.

We shall accomplish our object best, perhaps, by considering the conditions essential to the healthy development of plants, and in what respect chemistry

ated to these conditions. And, first, we may inquire, Do all plants re- the same conditions for their healthy growth? A little reflection will us they do not. Tropical plants will not flourish so well in cold as in ı latitudes, nor will the same species of plants flourish equally well in all in the same latitude. Are we then called on to study the conditions iar to each individual species? If so, our field of inquiry widens at once ın immense expanse. For the purpose of the farmer, however, it will be ient to consider the conditions of those plants in the cultivation of which expending his labor and capital. In this State, for instance, Indian the cereal grains and the various fruits and roots are the plants in which chiefly interested, and the conditions of whose growth he is especially l to study. We shall accomplish our object on this occasion if we con- ur attention to a single species.

э question then recurs, what are the conditions most favorable to the hy development of plants? For it is by an analysis of these conditions we shall best gain a clear idea of the relation of chemistry to agriculture. eful study will teach us that these conditions are of a twofold charac- Plants are conditioned by the objects that surround them and furnish their food, as soil, moisture and the atmosphere; and, secondly, by the ı which act on these substances, as heat, light, electricity, chemical force, etism, capillary force, and probably other forces with which we are but :fectly acquainted. In other words, we have to study the elements of ı plants are made; and, secondly, the forces which act on and build up elements into organic structures. Moreover, all these conditions must at the same time, and in the proper degree, that plants may flourish. nust be present, of the right kind and in the right quantity. The same e of moisture and the atmosphere. The necessary forces too must act, rith the right degree of intensity. No single substance or single force l suffice to make a plant. Carbon or charcoal is an essential element in ructure of every plant, but carbon alone could never make a plant, what- orces might act on it. The same is true of every other element. Heat hysical agent indispensable to vegetable growth, but heat alone could produce a plant. In fact, all the elements required by plants, and all rces necessary to weave those elements into cellular tissue and other ic compounds, must be present at the same time, constituting a kind of ex condition in which a nice adjustment of material and force, the web vegetable organism, is woven. Nor is it difficult to see that, of all the tions within which plant-life is possible, and the range is very wide, cer- onditions will be more favorable to its development than any other, and ınder these a plant will attain its maximum growth, and mature the ınd best seed.

it must be observed that of these conditions, some the farmer can modi- ıers not, or only partially. Soils can be modified in quality by adding ınces which they do not contain; in texture, by loosening or stirring by various mechanical means, and by allowing organic matter, like stub- green crops, to decay *in them*. *In* thus modifying his soils lies the chief

power of the farmer to increase his harvests. The quantity of moisture, also, is in a measure under his control. When present in excess it can often be removed by drainage, and when scanty it can sometimes be increased by irrigation: but long continued rains or drouths, causing wet and dry seasons, are, for the most part, beyond his control. It is not denied that climate can sometimes be modified by man, so that districts generally dry may receive rain sufficient for ordinary vegetation; but this, even in cases where it is possible, involves agencies extending over a considerable period of time. The atmosphere, too, is a necessary agent in vegetable growth, but the proportion of its gases, with some slight exceptions, cannot easily be modified by man. The physical agents, heat, light, electricity, magnetism and chemical affinity, play a very important part in plant-life, and, although they can be transmitted into each other, so that a given quantity of heat can evolve an equivalent quantity of electricity, and this electricity a corresponding quantity of magnetic or chemical force, and although these forces (if, indeed, they be more than a single force under different phases) may, in their relation to vegetable growth, lie much more in the power of man to modify than has been supposed, still that farmer would be sanguine who, in the present state of knowledge, should think to exercise more than a limited control over these capricious agents.

Thus far we have stated only the general conditions of plant-life, and how far the agriculturist can modify them. We come now to examine these conditions more closely, and to inquire how chemistry is related to them. As already stated, they are of a twofold character. They involve matter and force. First, then, the matter of plants. Our inquiries on this head are embraced in three questions. First, of what are plants composed? Secondly, whence is it derived? and, thirdly, in what form is it taken up by plants? All of these questions are of a purely chemical nature, and it is here, therefore, that agriculture and chemistry occupy common ground, or rather agriculture employs chemistry to solve its problems. If agriculture asks of what plants are composed, chemistry answers by analyzing them, and showing that they are made up of certain so-called proximate constituents, as cellular tissue or cellulose, starch, sugar, gum, pectine, resin and organic oils and acids; also, gluten, albumen, caseine and organic bases, etc.; that some of these constituents, like cellulose, are common to all plants, that others, like the alkaloids, strychnine and brucine, are found only in a few plants, while others, like starch and sugar, etc., are found in many plants, but in variable quantities. If agriculture inquire further, of what these constituents are composed, chemistry answers by resolving them into their elements, and teaching us that, as a whole, they are composed mainly of fourteen of the sixty-three known elements, viz.: oxygen, hydrogen, nitrogen, carbon, sulphur, silicon, chlorine, phosphorus, potassium, sodium, magnesium, calceum, iron and manganese; that some of the constituent, like cellulose, starch, sugar, etc., consist of only three elements when pure, viz.: oxygen, hydrogen and carbon; that others, like some of the vegetable alkaloids, consist of the same elements with nitrogen superadded; that these three or four elements constitute the great mass of matter in plants, and that the other elements in plants are

found there in relatively small quantities, and these even very variable in different species.

But, besides these fourteen elements, which can be detected in most plants with comparative ease, chemistry detects others which exist there in very minute quantity, so much so as to escape the ordinary means of observation. It is only recently that, by improved methods of analysis, the rare alkaline metals Lithium, Calcium and Rubidium, have been discovered in the ashes of plants. In fact it is as easy now to find lithia in the ash of a cigar, as it was formerly to find potash in the ash of the grape, the sugar cane, the beet or the cereals. Fluorine is another element of which traces have been found in the ashes of certain plants, and it is suspected of being in most plants, although in so small quantity as to escape detection. Iodine and bromine are found in sea plants; possibly they exist also in other plants. The strong family resemblance of the elements chlorine, bromine and iodine, and the circumstance that they are almost always associated in nature, and the fact that chlorine is usually found in plants, leads to the suspicion that possibly iodine, and perhaps bromine, may be there too, in extremely small quantity.

Small quantities, too, of lead, zinc and copper are said to have been found in the ashes of certain specimens of the beech, birch and fir; and tin, lead, zinc and cobalt in the ashes of the oak. The ashes of a certain violet are said to contain so much zinc, that places where it grows are selected for opening mines of zinc. Alumnium is found in the lycopodium, and perhaps some other plants.

Fourteen elements, then, exist in most plants in sufficient quantity to be easily found; three or four of these make up the great bulk of the plant, the carbon constituting, in wood dried at 150° centrifugal, about one-half the weight, the ashes from ½ to 1½ per cent., and the rest being oxygen, hydrogen and nitrogen, the first two in nearly the ratio to farm water, with usually a slight excess of hydrogen. The nitrogen averages about one per cent. In addition to these fourteen elements we find one or more of fourteen others in a few plants, in almost infinitesimal quantity, and the number will probably be increased hereafter.

The question arises whether all these elements are absolutely necessary to the growth of plants. Some, we know, are. A plant could not exist without oxygen, hydrogen, nitrogen and carbon, any more than a building could exist without solid materials, like wood, bricks or stone, or the animal without bones and muscles and the materials of which to make them. The same is true, to a considerable extent, of potash, soda, lime and magnesia, and iron and phosphorus. It was a question, some years ago, whether these inorganic constituents were necessary to the growth of plants, and prizes were offered, by societies interested in the subject, for a satisfactory solution of the problem; and it is now a fact, as well established as any in agricultural chemistry, that plants cannot thrive without them. They are a necessary part of the food of plants, and perform functions which make up an essential part of the life of plants.

But how is it with those elements which are found only in very small quantity? Is their presence necessary, or merely accidental? Have the plants absorbed them in some such way as a person sometimes takes harmless or even poisonous substances, by mistake? It certainly is not safe to conclude that their influence in the processes of life is commensurate with the quantity in which they are found, because no fact is more certain than that very small quantities of substances are sometimes very beneficial, and sometimes very injurious—even fatal—to the life of animals. Why may not the same be true of plants? The probability is that no substance, even in very small quantity, can enter the circulation of a plant without modifying, in some way, the processes of life, and imparting to it properties and impressing on it an individuality which it would not have without it. A substance naturally foreign to a system, and even poisonous to it, may, if taken in sufficiently small quantity, not only modify some function without becoming fatal, but create a necessity for its presence, so that life, even, would be endangered without it. The eating of arsenious acid is a case in point. A person may acquire the habit of taking daily a quantity of arsenic, which, at first, would have proved fatal; but when the habit is formed then it must be continued: that is, the arsenic has either created a function, or so modified existing ones as to make its presence necessary. And something similar is doubtless true of plants. Different soils contain small quantities of different substances, which, absorbed by plants, may prove beneficial or injurious to their development, and may have their influence, among other causes, in producing those peculiarities so noticeable in the same species of plants. Why is it that clover, manured with gypsum, is so different from that manured with something else, in the size of its stems, leaves and flowers, as almost to be considered a different species?

But let us return to the elements. Each one of them has certain properties, which are peculiar to it and which distinguish it from every other element; and these properties vary, either in kind or degree, with every change of condition to which the element is subjected. Four of them—oxygen, hydrogen, nitrogen and chlorine—are gases at ordinary temperatures, and the first three have resisted all efforts to condense them to liquids. They are, in the free state, permanent gases. Fluorine should probably be added to the number, although so little is known of it, in the free state, that little can be said of it. The rest, with the exception of bromine, which is a liquid, are solids. In their affinities, or their tendency to combine with each other, these elements are very unlike. Some, like nitrogen, are of an indifferent nature, manifesting scarcely any disposition to combine with other elements. Others, like oxygen, have an active nature. They are strongly inclined to combine with others. Every case of ordinary combustion is an example of energetic combination of oxygen with carbon and hydrogen. The same process, or a similar one, takes place more quietly in decay. In these cases oxygen acts as a destroyer. But it is equally efficient in building up. Indeed, oxygen presents the singular anomaly of an element ever busy in building organic structures, and then, as if dissatisfied with its work, of pulling them down, and

vith their ruins building new ones. It is this element, more than any other, hat causes that ever-recurring cycle of change from life to death and from leath to life, which is going on about us; and it is impossible to have an ac-:urate knowledge of the processes of vegetable growth without a thorough cnowledge of this element. Possibly, with such knowledge, one may not be ble to understand vegetable growth, but it certainly cannot be understood vithout it.

When placed in peculiar conditions, these elements assume properties dif-'erent from those which they usually manifest. Thus oxygen, exposed to substances undergoing oxidation, or to the electric spark, or to the galvanic :urrent, assumes properties so unlike those which it usually has, as to appear o be a new element. In this state it is very energetic, combining even with hose elements which usually resist oxidation. It is possible, even probable, hat the nitric acid of the nitre beds owes its origin to this energetic kind of xygen; and it is possible, too, when the relations of this substance to vege-ation shall have been more studied, and better understood, that it will throw iew light on the chemistry of organic life. The influence of this powerful gent in the interior of the plant can easily be conceived to be very great, and he field here for investigation, therefore, is very inviting and promises a rich eward. Other elements, by a change of condition, may indicate a change of ther properties. For instance, sulphur crystallizes in two entirely different orms, according to the temperature to which it is exposed. The same is true f many other elements. Why it is so we cannot tell. But it is easy to con-eive, in fact it is difficult not to conceive, that the function of an element n the vegetable economy will vary with its changing properties. These new roperties, peculiar to certain conditions, often gradually disappear after the onditions cease in which they were induced. Elements in this state seem to e in a kind of unstable equilibrium, and ready to revert on the slightest oc-asion to their normal condition: like a wheel with an axis not exactly in he center, always tending to a state of rest with the heaviest part down-vard. These peculiar properties, which the elements manifest, on the normal nes for the conditions in which they were induced; and were those condi-ions the ordinary instead of the exceptional ones, then these exceptional and nstable properties would become the permanent and normal ones. Chemis-ry thus teaches us an intimate relation between the properties of an element nd the conditions in which they were induced. They stand to each other in he relation of cause to effect, a fact which he should do well to bear in mind nd study its significance; for it is a type which finds a fuller exemplification n the higher forms of vegetable life. The importance of an accurate knowl-dge of the properties of the elements concerned in vegetable growth is mani-est. The more accurate and profound it is, the clearer will be our insight nto the processes of life and the more will our views and theories be likely o be in conformity with truth.

But if a knowledge of the elements is important, that of their compounds s still more so, for it is mostly in the form of their compounds that the ele-nents are introduced *into the plant*; and it is through the reactions of these

compounds on each other in the interior of the plant, under the action of chemical affinity, modified by heat, light, electricity, etc., that all the different organic compounds are elaborated. If we would trace them, step by step—the changes that take place in the plant—and understand them, be able even to anticipate and predict them, we must know accurately the properties of the substances that come into play. We must know the changes which these properties undergo under different conditions, and the effect produced by the varying intensities of the different forces. It will at once be seen that the subject is a complicated one. It is a problem in which all the quantities are variables. But its difficulties will not be in vain if they impress the student with a sense of their magnitude, and nerve him to corresponding effort. It is only the fatal delusion of thinking we understand a subject, when we have penetrated scarcely beneath its surface, that will effectually prevent all progress. Of one thing we may be assured, that no superficial knowledge, no simple gleaning of an idea here and another there, will ever extend the limits of this field of knowledge. Patient and persevering study is required to understand what has already been accomplished, and he who shall grapple successfully with the difficult questions yet to be solved will not only confer a benefit on mankind, but give the clearest proof of an intellect of the highest order and of the severest discipline.

The next question is, whence are these elements derived: that is, where do plants get their food? There are only two sources—the soil and the atmosphere—from which they can come, for these are the only objects, so far as we know, which sustain any relation to plants with respect to nutriment. But how shall we know whether the atmosphere furnishes plants with food? Evidently by analyzing it and ascertaining, first, whether it contains the elements that plants require, and secondly, if so, whether it really furnishes those elements to plants. As a matter of fact, the atmosphere consists of four elements: oxygen, hydrogen, nitrogen and carbon—the identical ones that constitute the great mass of matter in plants. These elements exist partly in the free and partly in the combined state. Oxygen and nitrogen in the free state make up the great bulk of the atmosphere, in the ratio of about one volume of oxygen to four volumes of nitrogen. This mixture of gases contains variable quantities of aqueous vapor and small quantities of carbonic acid and nitric acid and ammonia. Such is the constitution of the atmosphere. Now, does it furnish plants with any of these substances, as food? Experiment teaches us it does. The very first step in the development of the embryo of the seed is accompanied with the absorption of oxygen from the air diffused through the soil; and when the plant has become sufficiently developed, one of the chief functions of the leaves is to absorb carbonic acid from the atmosphere. It has been, and is yet, perhaps, a question, whether nitrogen, in the free state, is assimilated by the plant, or whether it enters the plant as a compound, in the form of ammonia or nitric acid. In either case it comes originally from the atmosphere—the only difference being, it enters the plant in the former case as an element, in the latter as a compound.

But if the atmosphere furnishes plants with food, may not the soil do so as well? We learn, from the analysis of the plant, that it contains certain solid

ıstituents; and we learn, from experiment, that these constituents are ·ential to its healthy development. The plant cannot thrive without them. ıey are therefore essential to the fertility of the soil; for the soil is the only ırce from which a plant can get them. This brings us to the Chemistry of ils, and on this subject we have this question: Can Chemistry ascertain ːurately the composition of soils? The answer to this question will depend ry much on what is meant by composition of soils. If we include, in the 'm, those infinitely small quantities of substances which must be estimated the thousand or the ten thousand millionth part of the soil, then it must confessed that the task would be both difficult and expensive; and yet, ese very small quantities of substances often have great influence on the owth of plants. I cannot better illustrate this fact than by referring to ι-weeds. They contain iodine. In fact they are the only source of the line of commerce, and they obtain this iodine from the sea-water. But the antity of iodine in sea-water is so small that it cannot be detected by any .own re-agent, without evaporating a large quantity of water, although line is one of the most easily detected of the elements. When in solution the amount of not more than 1-800,000, it is easily detected by the usual agents. Now, if one hundred cubic feet of sea-water be evaporated down one cubic foot, not a trace of iodine can be found by the ordinary tests. ıis shows how minute the quantity of this element must be in sea-water; d yet the fuci and the algæ absorb a considerable quantity of iodine, and 'e to this element, probably, an individuality which they would not have thout it. Lithia, too, one of the alkalies, has been found in sea-water taken ›m the middle of the Atlantic ocean, but it was necessary to evaporate some ırteen hundred cubic feet to find it. These facts will give some idea of the ›or and expense accompanying the detection of these very small quantities substances. At the same time, with the means of research now at com- .nd, very small quantities of the alkali and the alkaline earths can be ːected, with far greater ease and accuracy than was possible ten years ago. a mixture of these, weighing not more than a few thousandths or even a llionth of a milligramme, they can all be detected with ease at the same ıe. In this way it has been found that lithia, which was formerly thought be exceedingly rare, is very widely distributed in nature, being found in ; three constituents of many granites, in limestones of different geological 'mations, in the spring water issuing from these formations, in the ashes of ıits that have grown on soils formed by the disintegration of these rocks, the blood, the milk, and even the muscles of animals that have fed on these .its. We conclude, then, from what has been said, that it is possible to ı in a soil exceedingly small quantities of these substances essential to the ılthy growth of plants, but that there is a limit at the same time, even ːh the aid of the spectroscope, beyond which it would not be advisable or ıcticable to go. In our general estimate of the value of chemistry, as a ans of ascertaining the composition of soils, we must bear in mind that a l analysis of to-day is a very different thing from what it was ten years

ago, and that as the means of investigation become more accurate, the more valuable will chemistry become in its relation to agriculture.

But if chemistry can ascertain with great accuracy the composition of the soil, it is still necessary to begin with the analysis of the plant, for how else can we tell whether a soil is suited to the growth of a plant? Different plants vary in the quality and relative quantity of their constituents, and a soil that is fertile for one plant may be barren for another. He, therefore, who analyzes a soil without analyzing the plant to grow on it, or at least knowing its composition, fails to see the relation of the one to the other. The plant, then, must be the starting point. And to illustrate, let us take the wheat plant; and let it be a perfectly healthy, well developed plant, formed under the most favorable conditions, and of such a kind as we should like to see our fields covered with. We analyze it carefully, and ascertain its its composition. We thus learn what materials are necessary to make a wheat plant, and at the same time what materials a soil must have to produce good wheat. The soil may have other materials in great abundance, that contribute little or no food to the plant, and these materials may be very unlike in different soils—in fact they generally are; but the soil must contain, as an indispensable requisite to fertility, those substances required by wheat as food. We do not say that a soil containing these substances will necessarily be fertile, but we do say that it cannot be fertile, for wheat at least, without them. Their presence is one of the conditions of fertility, and but one. If they are present in such a state as not to be available to the plant, they may well be absent, for the plant can derive no benefit from them, and such is the case when they are locked up in undecomposed minerals, like feldspar-mica, etc. Fertility, then, implies not only the presence of elements required by plants as food, but their availability as such.

If, now, we examine more carefully the analysis of the wheat plant, we shall find the number of constituents derived from the soil comparatively small, at least those which need to claim our attention. For there are some constituents of wheat that are furnished by all soils in sufficient quantity for healthy growth; such, for instance, are iron, manganese, soda, silica acid, and we may add, probably, magnesia. But there are others that are not always present in sufficient quantity for the wants of the plant. Among these may be mentioned potash, lime, phosphoric acid, and, perhaps, sometimes magnesia. The number will not usually exceed five or six.

Now, a soil that does not contain these substances is barren for wheat. If it had them once, and has been deprived of them by wheat raised on it many years in succession, it is now, for the purpose of wheat culture, no better than if it had never had them, and a farmer might just as well turn his sheep into a field of weeds or of sand, and think to fatten them there, as to sow wheat on such a soil and think to get a good crop. What, then, is to be done in such a case? Why, evidently, give the plant what it wants to eat; that is, add to the soil a mixture of four or five substances, that the plant wants to feed on, and if the soil does not become fertile, it will be from the lack of some other condition of growth than food. If from any cause the farmer fail, either through want knowledge or inability to add these substan-

ces to his soil, and sees his crop diminish gradually from year to year until he gets only twelve or fifteen bushels, when he should have twenty-five or thirty to the acre, then he may conclude he is starving his wheat plants as truly as he would his cattle if he should give them only half enough to eat.

What has been said of the wheat plant may serve to point out the course to be pursued with any other plant. We must know its composition, and then furnish the soil with what will nourish it. This is simply manuring; and hence we see that manuring is only the art of feeding plants. To do this intelligently and well we must know what they feed on, and in what form their food is best assimilated by them; and the relation of chemistry to agriculture in this respect is to teach us the proper kind of food to give them.

Another question yet remains, viz: in what form are those substances taken up by the plants, as elements, or as compounds? Most of the elements occur in nature only in the form of compounds, and of those found in plants, not more than half a dozen are often found free. The inference therefore is, that plants take up the elements mostly as compounds. This is in accordance with a general law, that the higher the organism, the more complicated food it requires. The food of animals is more complicated than that of plants, and that of plants is, for the most part, not elementary. All the metals found in plants enter as salts. Potassium, for instance, as sulphate, carbonate, silicate, phosphate, or chloride of potassium; and so of the other metals —at least, those salts of them that are soluble in water. Carbon enters, as carbonic acid, mostly through the leaves, but also more or less through the roots. Hydrogen passes into the plant mostly with oxygen, as water, but also to a certain extent, probably, as ammonia and nitric acid. Phosphorus, with oxygen, as phosphoric acid; silicon, with oxygen, as silicic acid, and sulphur in like manner as sulphuric acid, pass into plants in the form of soluble salts. Chlorine enters the plant mostly in combination with sodium, as common salt. Much diversity of opinion exists with respect to the assimilasion of nitrogen. Some believe that it is absorbed as a gas directly from the atmosphere, and assimilated as such; others, that it enters the plant as ammonia or nitric acid, and think they have, in the action of ammonical manures, a strong argument in support of that view; others think nitrogen enters the leaves, and there coming into contact with ozone, is converted into nitric acid, or some oxide of nitrogen, and in this form is assimilated. It is not the place, nor have we the time here to bring forward the arguments and the experimental results which are adduced by the supporters of these different views; suffice it to say that the question lies wholly in the field of chemistry, and that if it shall ever be decided, it will doubtless be decided on strictly chemical grounds. Such, then, are the compounds that become the food of plants.

Another question of interest, in this connection, is the state in which these compounds exist in the soil, when taken up by plants. And here again a diversity of opinion obtains. It was formerly supposed, and is so now by many, that these salts, which constitute, in part, the food of plants, are in solution in the soil, and, circulating there, come into contact with the roots, and are

absorbed by them. But the opinion now entertained by some is, that these salts are not exactly in solution, but adhere, with a certain force, to other constituents of the soil, like humus, clay, lime, etc., and are thus retained, ready to be given up to the roots as soon as they shall come into contact with them. This force seems to be a feeble manifestation of chemical affinity, very like that by which coloring matters adhere to animal charcoal or to the fibres of cloth. There is doubtless truth in both these opinions; and a careful investigation of the subject will probably teach us that the food of the plant varies, not only in the quality and quantity of its constituents, but also in the condition in which it exists in the soil.

It may not be improper, in this connection, to say a word on conflicting views entertained by scientific men. In the judgment of some, such views are sufficient to throw doubt on all conclusions of science. It must be borne in mind that a new science, or a new application of an old one, is always accompanied with more or less mistakes, even by those best versed in it. The enthusiastic pioneer in a new field of knowledge will be exceedingly fortunate if he do not misinterpret some facts, and frame some theories, which will prove, in the end, more or less visionary. No mind, however keen its penetration, can comprehend at once all the bearings of a science in a new field of application. Hence we must expect some mistakes. And then, too, unless the scientific man is extremely cautious in his use of language, he will sometimes make loose statements, which, although intended to express facts in his mind, do really express something else and mislead others.

But this is not the only difficulty. If mistakes have been made by the investigators of the principles of agricultural chemistry, how many more have been made by those who sought to apply them. With scarcely the rudiments of chemistry, and animated by the prospect of increased harvests, they have hastened to put in practice the principles. The conditions of their experiments have been as varied as quality and texture of soil, temperature and moisture could make them. Precautions, on which depend so much the success of experiment, have been neglected, either because they were unknown or deemed unimportant. And thus, experiment after experiment, made in this loose, haphazard way, has failed, as might have been predicted it would fail, and the failure has been charged to science, when it was due to the well meaning but unskillful experimeter. There can be no doubt that a large proportion of conflicting views and statements, on questions of agricultural chemistry, are due to bad experimenting. This is well illustrated by the beginner in the laboratory. He often fails in the simplest chemical reaction, because he has neglected some precaution: that is, some necessary condition.

His first impulse is to declare the statement false; but when he has learned how to do it, the discrepancy between statement and fact disappears, and he is surprised that so slight a variation in the experiment should have caused his failure. Is it then surprising that the same kind of bad experimenting extended over the whole field of chemistry, applied to agriculture, should lead to conflicting views?

The best way to obviate this difficulty is to become thoroughly familiar, ɔt only with the principles of chemistry, but also with its practice. To ex- ɘriment successfully without knowledge and experience, is just as impossi- le as to be an able, successful practitioner in any of the so-called learned pro- ssions without years of patient study.

Thus far we have touched only on the outskirts of the chemistry of the lant. Its constitution, its food, and the condition in which its food is taken p, have been noticed. The next step would be to enter the laboratory of ıe plant, where this food is digested, and to study the reactions which take lace under the action of chemical force, modified by heat, light, electricity ɑd vitality—reactions by which the different organic compounds are elabo- ıted This is the field of vegetable physiology. Its province is the func- ıons of the organs of plants. But these functions consist in large measures f chemical reactions. Take the formation of starch in the leaf. The mate- ials of which it is formed are as unlike starch as they can well be. The car- onic acid is absorbed directly from the atmosphere; the water and the alka- ne salts pass through the roots up into the leaf, and there in that little work- ıop these substances, reacting on each other, produce starch, and this process ɔntinued, that is, this continuous reaction, constitutes a function of the leaf. 'ary the conditions a little—that is, replace some of the reacting substances y others, or change their relative proportions, or vary the intensity of the ıodifying forces—and tartaric acid, perhaps, or some other organic product, ıight be produced. And so of all organic compounds. These infinitely mi- ıute changes of condition, either in the materials or the forces, on which may lepend the nature of the product, can be learned only by the nicest observa- ion and the most patient study. It is the want of a definite knowledge of hese changes of condition that renders the reproduction of organic sub- tances in the laboratory so difficult. But if, from the intricacy of the condi- ions which underlie the processes, we are as yet unable to imitate the pro- esses successfully in the laboratory, they are none the less chemical proces- es, and show that the relation of chemistry to vegetable physiology is as inti- nate as its relation to agriculture. In fact, the formation of a plant, from ncipient growth to maturity, is largely a continuous and complicated series ›f chemical reactions, and the plant itself, in so far as it is the result of such eactions, may be called a chemical product.

If then it be true that vegetable growth is largely a series of chemical re- ıctions, resulting in the formation of the proximate constituents of the plant, t is clear that chemistry must sustain a most important relation to agricul- ıure, and deserves the careful study of all who, in their husbandry, would lerive from it the benefit which it is suited to impart. Because it has failed o fulfill the extravagant expectations, excited some years since by the writings ›f Liebig, we are not to infer that it is of no practical advantage to agricul- ıure, and that the study and application of its principles in the growth of ɔlants will be time and labor lost. Very many futile efforts have been made o reduce the gold from Colorado ores, but we are not to infer from this that chemistry is of no benefit to metallurgy. It is without doubt true that a sub- ect of such complexity as the chemistry of plants has not been, and is not

yet, well understood. Whatever difficulty there is, lies not in the chemistry of agriculture, but in our ignorance of it. As soon as we have an accurate knowledge of the conditions and laws of growth, and in our efforts to aid nature, work with and not against her, then the discrepancies and apparent contradictions, always incident to a new science, or a new application of an old one, will disappear, and we shall have the greater cause to admire the wisdom and skill of Him who evolves, through this interaction of materials and forces, the many forms of plant life.

SECOND DAY—9 O'CLOCK.

Mr. M. L. Dunlap moved that Dr. E. S. Hull, of Alton, be elected chairman of the Farmers' Institute, now in session.

The motion was carried.

Dr. J. M. Gregory moved that O. L. Barler, of Upper Alton, act as Secretary of the Institute.

Carried.

At the suggestion of Dr. Gregory, Mr. M. L. Dunlap moved that the morning hour of meeting be changed from 9 o'clock to 10 o'clock.

Carried.

Dr. Gregory—I will take this opportunity to announce to the visitors present, that the college library will be open when the lectures are not going on, to which all are invited.

METEOROLOGY.

BY PROF. WM. M. BAKER, CHAMPAIGN.

The subject assigned me in the present course of lectures is not of my own selection; neither is it one to which I feel capable of doing justice, as indeed no man can, in the short space of one lecture. Meteorology is a subject so varied and extensive, that a person is puzzled rather as to what *not* to say, than as to what he shall present. It is very commonly thought, when the science of Meteorology is mentioned, that it relates only to the meteors that occasionally shoot athwart the sky, or to the so-called shooting stars, whose fiery flight we may see almost every night; and it is therefore supposed to have but little general interest. Or, if extended to include Climatology, it is supposed to have reference chiefly to the influence of the moon upon the weather, and to the prediction of storms, or of changes of temperature. Failing in these, it is thought to have no value.

But when it is seen of what this science really treats—the wide extent of investigations it covers—the varied phenomena sought to be explained by it—we shall feel, I think, that, though we are not yet able to foretell the changes of weather with certainty, and though the influence of the moon upon climates is still a matter of dispute, the science of Meteorology is neither a barren nor an unprofitable one.

In the words of a distinguished writer upon this science, "Meteorology treats of the constitution and weight of the air; of its temperature and moisture; of the movements of the atmosphere; of the precipitation of vapor in the form of dew, hoar-frost, fog, cloud, rain, snow and hail; of the laws of storms, including tornadoes and water-spouts, with various electrical phenomena, including atmospheric electricity, thunder-storms and the polar aurora; as also various optical phenomena, including the rainbow, twilight, mirage, coronæ and halos; to which are generally added ærolites and shooting stars."

The extensive field which it covers will thus be seen, as also the futility of attempting to treat thoroughly of even one of the subjects indicated, in the short space allotted me. I shall be pardoned, then, for any lack of continuity or logical sequence that may appear in what I have to offer.

It may be seen, also, from the complex nature of the science, the many and varied phenomena of which it takes account, why it cannot be brought down to strict mathematical certainty. As Humboldt, who devoted a long life to the investigation of this department of physics, says: "The processes of the absorption of light, the literation of heat, and the variations in the elastic and electric tension, and in the hygrometric condition of the vast ærial ocean, are all so intimately connected together that each individual meteorological process is modified by the action of all the others. The complicated nature of these disturbing causes increases the difficulty of giving a full explanation of these involved meteorological phenomena, and likewise limits, or wholly precludes, the possibility of that predetermination of atmospheric changes which would be so important for horticulture, agriculture and navigation, no less than for the comfort and enjoyment of life. Those who place the value of Meteorology in the problematic species of prediction, rather than in the knowledge of the phenomena themselves, are firmly convinced that this branch of science, on account of which so many expeditions to distant mountainous regions have been undertaken, has not made any very considerable progress for centuries past. The confidence which they refuse to the physicist they yield to the changes of the moon, and to certain days marked in the calendar by the superstition of a by-gone age."

If Meteorology could only foretell storms, changes of the weather, etc., of how great value would it be, not only to the farmer but to all classes. When the thermometer and the barometer were first applied to meteorological study it was fondly hoped that this problem would be solved, but years have passed and the end is not reached. Yet great results have been attained—general laws have been discovered, and steady progress has been made, if not as grea as was fondly hoped, yet far from contemptible.

There have not been wanting those who have imagined themselves the discoverers of so *desirable a thing* as the law which would enable them to fore-

tell with certainty weather changes; but they have all, when tried in the balance of actual experiment, proved wanting. It may be stated as certain, that, with our present knowledge of the science, no man can foretell with any certainty, so as to be of practical use, the changes of the weather or the approach of storms. A few years since one man believed he had discovered a principle or theory which would enable him to do this; but, when asked by the Regent of the Smithsonian Institute, as a condition to their publishing his book, that he would foretell the weather of one month in each season of one year, he declined the attempt.

Turning now to the other subject of popular expectation, viz: the influence of the moon upon the weather, what shall be said? Throughout the whole community, nearly every person has some sort of a belief in the influence of the moon over planting and all of the operations of the farm. It seems impossible that so wide-spread a belief should not have a good foundation, and yet extended and careful investigations leave us still in doubt upon this point. Olbers compared carefully for fifty years the moon's positions with the weather, and stated that he could see no effect that it had.

It may be of value to state here that the Herschels deny any belief in the existence of any system of lunar influences, and especially repudiate the weather table often attributed to them.

Samuel Horsley, L.L.D., in 1775—then Secretary of the Royal Society—states as the result of his investigations, after quoting largely from Greek and Latin writers: "On the whole I do not deny that the observant husbandman will find a variety of useful prognostics in the appearance of the moon and the heavenly bodies in general, but they will be prognostics of no other kind, and for no other reason, than the sputtering of the oil in the industrious maiden's lamp, or the excrescences which gather round the wick, *i. e.*, they are in our own atmosphere."

At the meeting of the American Association for the advancement of Science, last August in Chicago, Prof. Loomis, of Yale, a well known meteorologist, read a paper upon the influence of the moon, of which the following is a synopsis: "Several meteorologists have attempted, by a comparison of a long series of observations, to determine whether the moon exerts any influence upon the weather. From a comparison of twenty-eight years of observation in Germany, Schubler, in 1830, deduced a sensible influence of the moon; the number of rainy days at the time of the second octant being twenty-five per cent. greater than at the time of the fourth octant. From a comparison of observations made at Paris, Orange and Carlsruhe, Gasparin arrived at results not differing greatly from those of Schubler. By a comparison of sixteen years of observation at Greenwich, nine years at Oxford, and sixteen years at Berlin, Mr. Harrison, of England, has obtained results which are remarkably consistent with each other, and which indicate that the moon exerts an appreciable influence upon terrestrial temperature—the maximum occurring six or nine days after the new moon, and the minimum about four days after the full. The difference between the maximum near the first quarter and the minimum near the last quarter is two and a half degrees, Fahrenheit. These results, which are so different from what might have been anti-

cipated, Mr. Harrison explains by supposing that the moon really attains its greatest heat about the last quarter; but that the heat which the moon radiates to the earth is entirely dark heat and therefore absorbed by our atmosphere. This heat raises the temperature of the air above the clouds, causing increased evaporation from their surface, by which they are dispersed, and thus there is an increased radiation of terrestrial heat to the sky, and consequently a diminution in the temperature of the air near the ground. He supposes that opposite results must occur at the period of minimum heat in the moon. Upon extending the comparison to forty-three years of observations at Greenwich, Mr. Harrison finds still a fluctuation of temperature, but the range is reduced to one degree and one minute, instead of two degrees and five minutes. Mr. Ballat, on tabulating a series of seventy years' mean daily temperature, according to the moon's age, found that the highest temperature occurred during the seven days after full moon, being almost precisely apposite to the results of Mr. Harrison. Schiaparelli has made a careful analysis of thirty-eight years of observations, made at Vigirano, near Milan, in Northern Italy, and has attained results which are also remarkably consistent with each other. They show that about the time of the last quarter of the moon there is a maximum in the number of rainy days, as also in the frequency of storms and in the degree of cloudiness." The Prof. then exhibited a table of results which he had deduced from seven years' observations, and drew the conclusion that the moon did affect the weather, and maintained, in direct opposition to Prof. Herschel, that the moon, just before its full, influenced the weather toward cloudiness rather than clearness, and followed the same law as the sun.

When, after so long and careful investigation, philosophers are still in doubt, it would seem that the moon's influence may be disregarded in practical life. The air we breathe—that which, in its freedom, sweeps past us and bloweth where it listeth—who has ever fathomed its mysteries? Perhaps that which we are this morning inhaling was breathed by the lips of beauty thousands of years ago. Since creation it has swept around the world—now over the burning sands, and then over arctic snows—over orange groves, and across the stormy ocean, it has traveled, and how little we heed it. Thousands of years ago, vegetation, by the help of sunlight, secreted in earth's treasure house some of its ingredients, and now, as we burn the coal, we liberate them, again to play their parts.

The causes of the various winds are not completely understood, but extended investigations show the following results as to the direction of the prevailing winds over the globe. Throughout the equatorial region of the globe the winds show a remarkable uniformity. On the north of the equator they blow almost uniformly from the north-east quarter, while south of the equator their direction is from the south-east. These form the trade winds, so-called. In the Atlantic, the north-east trades extend, on an average, from near latitude 7 deg. north, to latitude 29 deg. north. The south-east trades extend to 20 deg. south. Between these there is a belt of variable winds, or of calms, extending from 150 to 500 miles in breadth, according to the season. The center of this belt of calms is north of the equator. Beyond the influ-

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ence of the trade winds we find also a belt of calms, or variable winds, the northern one being called the calms of Cancer, the southern the calms of Capricorn. These also vibrate up and down according to the season; the extreme vibration of the calms of Cancer being from 17 deg. north to 38 deg. north, the center being somewhere near 30 deg. north. Beyond these belts of calms it is found that the prevailing surface winds are in a contrary direction from the trade winds, *i. e.*, from 29 or 30 deg. north, to near 60 deg. north. The prevailing winds are from a south-westerly direction—the westerly winds in one latitude being to the easterly as 5 is to 2. Beyond 60 deg. north, again, there is a belt of comparative calms, north of which the prevalent winds are again from a northerly and easterly direction. As the surface currents are so prevalently in these directions, it follows of course that there must be upper currents in the opposite directions, to restore the disturbed equilibrium of the atmosphere.

But, it may be said, this is only theoretical, how can it be proved that such upper winds actually exist? Strict proof in such a case is, of course, difficult to give, and yet we are able to give what amounts very nearly to a demonstration. Ashes from volcanoes are occasionally thrown higher than the prevailing surface winds, and falling into the upper current, are by it carried in the opposite direction, and by their fall tell us of this current. Thus, in 1812, the volcano of St. Vincent threw out an abundance of ashes. Much ashes fell at Barbadoes, ninety miles east, though the wind was directly opposite. In 1835, from Cosquina, in latitude 13 deg. north, on the shores of the Pacific, ashes fell upon Jamaica, 700 miles north-east from the volcano, while ashes were carried westward more than 1200 miles. In southern Europe, at Genoa and Lyons especially, a fine dust occasionally falls, which has been generally supposed to be from Sahara, and taken up by the siroccos. But Ehrenberg, upon subjecting it to a microscopical examination, found that it contained organisms peculiar to the valley of the Orinoco, and the conclusion is inevitable that it comes from South America, and not Africa. On the summit of Maunakea, at the Sandwich Islands, the wind is generally found to be strong from the south-west, while the trade wind at its base is south-east. The Peak of Teneriffe is not of elevation sufficient to reach the limit of the lower half of the atmosphere, and yet the wind on its summit is often contrary to the wind at its base, while the clouds over the peak constantly move in a direction opposite to the trades.

In the middle latitudes the upper current moves from a northerly direction, as is shown by the following facts. In 1783 Mount Hecla emitted smoke and ashes for more than two months. The smoke rose to a great height in the atmosphere, and spread over nearly the whole of Europe, forming what was called a dry fog. From the north-west it extended south and east to Italy, and even to Syria, thus showing that, during those two months at least, there must have been an upper current contrary to the prevailing surface one. During another eruption of this volcano, in 1845, great quantities of ashes fell as far south as the Orkneys.' Æronauts who have ascended to the height of 10,000 feet in the middle latitudes, usually find the wind blowing from *the west*, and if they ascend higher, from a point north of west. If, during a

specially dry time, clouds are observed at a great elevation, they are usually found to move from a point north of west.

The system of atmospheric circulation may be stated thus: Within the tropics the surface current moves toward the equator, and the upper current from the equator. In the middle latitudes the surface current is moving from the equator, and the upper current toward the equator. In the polar regions the surface current is from the poles, and the upper one toward the poles. These currents are, of course, modified by the revolution of the earth, which makes the trades north-easterly and south-easterly, and the winds in our latitude south-westerly.

In regard to storms also, some laws have been learned which may now be regarded as settled.

1. All great storms are generally rotary.

2. North-east storms begin in the west and do not come from the east. The storm, on the contrary, advances east, and is generally followed by a west wind.

Thus the telegraph enables the cities east of us to know, hours before its arrival, the coming of a north-east storm.

Cyclones, or whirlwinds, are revolving storms of a more intense character. It is found that in the northern hemisphere they revolve contrary to the direction of the revolution of the hands of a watch, while in the southern hemisphere they revolve with the hands of a watch. Therefore the navigator is enabled by heeding the direction of the wind to sail out of its power.

Storms generally move eastward at the rate of from 300 to 800 miles in 24 hours. The north wind felt in our own latitude is not always, nor perhaps usually, from the north. Indeed the lake districts are often warmer than the countries south of them, or at least have a milder average temperature. Thus in Michigan they raise the peach without difficulty, which is here so uncertain a crop. Generally the west is to be scanned to judge about the weather to be immediately expected, and the currents as indicated by the clouds give the best proof.

The question is often asked, where does our rain come from? It cannot come from the land, as only three-tenths of the surface of the earth is land, and the rivers are continually acting as drains to carry off the surplus. Obviously, then, the most of the water annually precipitated must be raised by evaporation from the oceans, and as nearly all the large rivers of the earth are in the northern hemisphere, presumably much of it from the southern oceans, being brought north by the upper currents, and others precipitated. The annual fall of rain is estimated at five feet. If this were taken from the torrid zone entirely, Lieut. Maury estimates that it would be equal to a river 3,000 miles wide, 16 feet deep, and 24,000 miles long. But the mean annual fall of rain is not alike at all points. Some places, as a point on the Himmalayas, have a fall of 50 feet annually, while others, as the deserts of Africa and Arabia, of Gobi, the table land of Mexico, and about 5,500,000 square miles of the western declivity of the Andes in Peru, are nearly or entirely rainless. We have a mean annual fall of a little more than 30 inches. A question of interest to us is, where do the waters of the Mississippi basin

come from? Some assert that they are brought from the Gulf of Mexico, while others contend that they come from the Pacific, passing in the upper current over the comparatively low range of the southern spurs of the Rocky Mountains, and descending to the earth at the calms of Cancer, thence to be distributed by the prevailing south-westerly winds along the extent of their course. It is a well known fact that mountain ranges have a tendency to cause condensation and deposition of moisture. Thus the prevailing trade winds from the south Atlantic, laden with moisture, sweep over the broad level of the plain of the Amazon, and by the Andes, being forced to deposit their superfluous moisture, are dry winds in Peru and Bolivia, while east of the mountains is a region of almost constant rain. At one time, at the White Mountains, I saw a storm detained a whole day by the mountains, it raining on the eastern side nearly 24 hours sooner than on the western.

Another question, towards the solution of which the science of Meteorology has made much progress, is as regards the causes of the difference of climates of places under the same latitude. We find England and Labrador at about equal distances from the equator, one with a mild and equable climate, the home of civilization, while the other is scarcely inhabitable. In the Orkneys, ponds are not frozen in winter, while in corresponding latitudes in British America, they are scarcely thawed in summer. And so throughout, the western coast of Europe has a much milder climate than the corresponding coast of our continent. So on our western coast, Sonora and California have climates very similar to Persia and to Palestine, while Vancouver and Sitka bear a resemblance in this respect to Great Britain and Norway. These differences are caused by the warm currents of the ocean impinging in either case upon the eastern shores, and thus elevating the temperature of the air and modifying the climate. It is found that the isothermal lines, or lines of equal temperature, ascend higher upon both western coasts. In the Mississippi basin we have, from our position, a high summer and a low winter temperature.

In regard to changes of the climates of different countries, a distinguished meteorologist says: "The climate of a country remains constantly the same from century to century. Observations for more than a century show no change in the mean temperature of the year, or of separate months; no change in the range of the thermometer; none in the time of the last frost of spring or the first frost of autumn; none in the annual amount of rain or snow. It is not certain that the climate of any country in these respects has changed for 2,000 years. By destruction of forests, streams dry up and droughts are produced, which are relieved by replanting, but this seems not to affect the mean amount of rain, or mean temperature." Thus we can predict the probable character of any month in any year. So, if several months in succession have been unusually warm, or unusually cold, we may expect that the following months will be of an opposite description. Prof. Loomis gives some prognostics, drawn from the face of the sky, clouds, etc., which may be of some practical value to some one, and I will therefore give them.

1. When the upper clouds move in a direction different from that of the *lower* clouds, or that of the wind then blowing, they foretell a change of *wind.*

2. When the outlines of cumulus clouds are sharp, it indicates a dry atmosphere, and therefore presages fine weather. Small, inky-looking clouds foretell rain. A light scud, driving across hazy clouds, indicates wind and rain.

3. Remarkable clearness of the atmosphere near the horizon, and an unusual twinkling of the stars, indicate much moisture in the upper regions of the atmosphere, and are therefore indications of approaching rain.

4. Halos, etc., indicate rain or snow.

5. Dew and fog indicate fine weather.

Having thus, in so disconnected and hasty a manner, run over some of the points of this interesting science, I cannot close without expressing my belief that, from the multitude of observers now at work, and of observations now being made, greater results than have yet been obtained are at hand. To a true theory of the science, every accurate observation, however humble, prepares the way. Nowhere is there more need of such observations than over the broad prairies of the northwest. Why may not every one now before me contribute his mite to this, and thus, in enriching others, enrich himself a thousand fold?

DISCUSSION.

Mr. M. L. Dunlap said that he had given this subject some attention, with a view of making some practical use of it in accounting for the many eccentricities of our climate. He believed that this science could be made available in a great many instances, but was well aware that it needs, to understand it, an immense amount of study and investigation. What the lecturer had said about the direction of the prevailing winds, and the philosophy of storms, accorded with his observation and experience. The direction of these storms often appeared to be from the north-east, but they came, in fact, from the west. He noted, as a singular fact, that a storm, starting at a given point, and moving forward with accumulating force, would pass over certain portions of the country harmlessly, while other portions were swept with terrible force. Our periodical eastern winds are indications of storms that may or may not bring rain. If the atmosphere is charged with moisture, we are liable to have a rain storm. When we have these eastern winds, you may note the fact that we are very apt, soon after, to read of a storm on the Atlantic coast.

In speaking of the trade winds, he showed that they were the cause of the cold south-west winds which sweep up through the Mississippi valley, to the injury of our fruit. Our productions are virtually grown in one climate and wintered in another—they are grown in the tropics, and wintered in the cold winds of the north.

This will account for so great loss of plants and trees. There is no way to remedy the evil but to plant timber belts; and it is for this reason that I have always urged upon farmers the importance of planting trees for the purpose of serving as shelter belts. There is another advantage in this. If we plant more timber, we will, of course, make the climate more moist, and clouds passing over timber lands give down the rain just as the mountain ranges wring out the last drop of water from the passing clouds. I think these observations will be found to be correct in the main.

Prof. BAKER, in answer to a question, said that the average rain fall over the whole earth was five feet per annum. We have here about 27 inches. The water is taken up by evaporation and falls in rain, in quantities as stated in the lecture. In regard to the great amount of water taken up by evaporation, we stated that it would form a mighty river, 16 feet deep and 24,000 miles long! So that the great Mississippi, as it flows to the gulf, has its counter Mississippi invisible in the air, bringing its waters back.

Mr. FREEMAN—The Prof. spoke of the necessity of timber belts as a protection against the influence of malarious diseases. Now this reminds me of a remark made to me by a man who went to Natchez 60 years ago, where they had the yellow fever. Natchez is situated on a bluff, opposite a marsh, to which they attributed these malarious influences from which they suffered. He spent 30 years there, and finally went to the north. He said that the better class of people began to move ont into the woods, back from the river, in order to escape this influence, but, until the country was opened up back from the river, they suffered from the diseases of the country. But after the country was opened up around them they seemed to enjoy immunity from these diseases.

Mr. ROBINSON—I would ask the Prof. what difference he finds in the thermometer when exposed to the wind—suppose the wind blowing from the east, you carry the thermometer from the west side to the east side of a belt of evergreens, what change is effected in the thermometer?

Prof. BAKER—The thermometer does not tell us how cold we are, but is simply an indication of the degree of cold.

Mr. ROBINSON—That is only a partial answer. I want to know what benefit the belt of evergreens is going to be. Now my experience is, that the thermometer will not show any difference. The degree of cold indicated is the same on either side when a

severe wind blows, although there is a difference, perhaps, of ten degrees.

Prof. Baker—It is true that the evaporation caused by the passage of the wind over the plants would affect them, as animals are affected by it, and they would really suffer from the cold winds as animals suffer from them, though the thermometer indicated the same degree of cold in and out of the wind.

Dr. Gregory—Dr. Draper asserts that there is actual heat generated in the tree. Bore a hole into a tree, and let the tree cool from the warmth from boring, and insert a thermometer, and you will find the tree of uniform temperature, warmer than the atmosphere. Now if this be so, the tree has the power to give off heat, and the wind blowing upon the tree would liberate more heat and take away moisture. These observations of Dr. Draper seem to me to be exceedingly interesting, and worthy of consideration.

Mr. Periam—My experience is, that a thermometer placed upon the east side of a belt of evergreens in the afternoon, at a distance of 20 feet, when the wind is blowing from the west, will show a range of ten degrees. The thermometer will sink ten degrees lower on the west side than on the east side.

Mr. Dunlap—It is easy to show the great advantage of evergreen belts in moderating the climate and warming the atmosphere. They take in heat in the daytime and give it off at night. That is the reason for the practice of some in planting every fourth tree in their orchard an evergreen. It is simply a matter of experience and observation that evergreens temper the climate. By planting these belts we will save our fruits, and may plant many varieties in the north which would fail without this protection. The practicability and advantages of this practice we expect to demonstrate in this institution, and to illustrate upon these grounds this, one of the great and leading facts essential to success in fruit culture, especially in the northern part of the State. There is no question but there is a vast amount of truth in the assertion of Dr. Gregory, that trees give off heat. Let us recognize this important truth, and not cease our tree planting until we are fully protected by these timber belts.

Mr. Robinson—It will take twenty-four hours for frost to penetrate to the heart of a tree two feet in diameter. It may be frozen externally, and not frozen at the heart.

Prof. STEWART—I have no doubt with reference to the temperature of trees being higher than the air about them. The tree is a living being as much as an animal. As the temperature of animals is higher than that of the surrounding atmosphere, so we may expect to find in plants a temperature higher than that of the atmosphere. There is this consideration, also. What is it that is going on when plants are growing? Plants grow by a series of chemical combinations, and where these changes are going on there is heat evolved. You cannot have chemical action without heat being evolved. Chemical action is that which produces heat in animal life, and the same is true in the life and growth of plants. We should naturally infer this from the nature of the process that is going on. I also desire to say this respecting the influence of the moon upon the weather, which matter has been alluded to in the lecture. I place no reliance upon the supposition that the moon has any influence upon the weather. I would suggest whether these contradictory results, arrived at by so many careful observers, are not attributable to local causes. Every section of the country has its peculiar climate, and may not these local causes produce these different results, instead of having to go to the moon to account for the weather? Had we not better stay upon the earth, instead of going off to the moon, and find causes at home, instead of abroad, for these changes of weather? I think, if we understood the matter fully, we should find that the moon had very little to do with the weather.

Dr. GREGORY suggested, in view of the fact which seemed to be established that trees generate heat, whether they have not, in this, the power to resist frost. The human system, if frozen, dies. He was inclined to the opinion that if a tree was frozen to the heart it would die also. But all this looked so much like mere theory, that it was hardly safe to advance such an idea.

Mr. ROBINSON questioned the position of Prof. Stewart that heat always accompanies chemical action. He was under the impression that there were cases of chemical combinations where heat was not evolved. Is it not so?

Prof. STEWART—I know of no instances of this kind. If you take the oil of vitriol and mix it with ice, there will be a chemical combination, and there will be produced a very low temperature. Still there is at the same time heat produced. I have not the slightest doubt of this. I know of no instance where there is

chemical combination without producing heat. With reference to the chemical action in the growth of trees, this of course explains the increased temperature, for chemical action produces increased temperature. In the summer, when the process of life is going on, when the different parts of the tree are forming these different chemical combinations, there will be heat.

Mr. DUNLAP—There is no question the tree has a twofold power—one of growth, and one of hibernation. In a state of growth there is going on chemical action, and of course there is heat produced. In a state of hibernation it has power to resist cold. The tree may freeze to the heart and not be seriously injured. There is another point to which I wish to call attention, and that is with reference to the influence of the moon on vegetation. In my practice I pay no attention to the moon. But there is this fact—and I wish the students here would give it their attention. If the moon fulls about the tenth of September we are more liable to have early frosts than when it fulls at any other time. If the moon fulls about the 20th of September we are less liable to early frosts than otherwise. It does not always so happen, but this is generally true. If this fact was regarded in the time of planting corn, and the estimate made of the time to mature the corn crop, which is 125 days, it would perhaps be well. This is the only practical fact about the moon's influence, and there is a good deal in it. If I am correct, we can save our corn crop from the frosts by early planting. At any rate, there is need of further investigation in this direction.

THE SOILS OF ILLINOIS.

BY H. C. FREEMAN, OF THE STATE GEOLOGICAL SURVEY.

The lecturer gave as the definition of the word soil, that part of the surface of the earth in which plants grow. It is a compound substance, formed from the decomposition and disintegration of rocks, and is peculiarly fitted to furnish food for plants. He gave an account of the origin of soils, which led to a minute description of that portion of the earth known as alluvium, terrace, loess, drift and tertiary. The disintegration of rocks which form our soils is caused by mechanical and chemical agencies. But there are other forces at work—the deposit and admixture of this debris is due to river and ocean currents, and to the ice in the glacial period.

The lecturer stated that the soils of Illinois were of themselves the study of a lifetime, and made mention of their varied form in the different portions of the State. At LaSalle, an upheaval has brought to the surface the St. Peter's sandstone, which is much used in making glass. It has the appearance of white sugar. This sand, appearing on the Illinois river, near immense beds of coal, suggested that the time would come when an immense business would be built up in glass manufacture.

We have at Peoria a different formation of soil, a sort of modified drift, known as the terrace formation, the result of the action of water currents. The yellow clay of other localities, and the soil peculiar to the prairies, were all mentioned, and the statement made that each variety of soils required different treatment, depending upon moisture, climate and drainage. The soil near Cobden seemed, to a great depth, to possess elements of plant growth. In one instance, in digging a cistern, a root of a peach tree was found, reaching down to the rock-bed, a distance of nineteen feet. The inference is, that the soil in this great fruit region has good drainage.

The lecture was illustrated by a diagram of the elevations throughout the entire length of the State, from Cairo to Dunleith.

The lecture was instructive to those who heard it, but it partook so much of the style of a recitation in a class-room, the life of which was all on the blackboard, that it was impossible for your reporter to take it verbatim and do justice to the lecturer, and he has not attempted it.

SECOND DAY—EVENING.

DR. WARDER'S LECTURE ON THE MANAGEMENT OF SOILS.

Mr. President: It would be well could we imitate an illustrious example set before us. A gentleman was asked to make some remarks upon a public occasion, and his reply struck me as one having force and sense in it. It was this: "When I have anything to say, I am always willing and happy to say it, and when I have nothing to say, I do not say it." Though I have been much interested in the subject assigned me, I yet feel that there might have been a much better selection made than you have made for the discussion of this topic. I would suggest a different wording of my subject. I would pre-

›r to limit the subject and talk to *earth-working*. The management of soi too large a question. I think it is better that I should confine myself to mply earth-working. This will be found to include all those operations 'hich have for their object the comminuting of the soil, and that treatment f the soil and plants called cultivation, whether done by one implement or ıother. The various kinds of utensils used in working the soil will be a ›ading topic of the lecture. The instruments in general use are the plow, ıe harrow, the roller and the cultivator, adapted to the draft of horses or ıttle.

There are also other utensils used, with hand-power, such as the spade and ifferent varieties of hoes, the "split hoe," as it is called by Virgil. Mr. Hexmer calls it the "pronged hoe." We find this one of the best of hoes. We ave also the scraping hoe, used for the purpose of destroying weeds upon ıe hard ground, and the grubbing hoe. These, however, are not so serviceble as the pronged hoe in stirring the soil. There is another class of tools— ıe rake and the brush.

Earth-working, therefore, covers all cultivation of the soil, and all cultivaion of the soil necessitates the use of implements of some kind. The plow :ands at the head of these implements. It is wonderfully interesting to race the history of this implement, and see the great progress that has been ıade since the earliest times. The figure upon the left (here the lecturer reerred to diagrams drawn on canvas and hung up before the audience) is a ıir representation of the implement used in early times for plowing. Before his, even, there was in use a ruder instrument still, a sharpened stick. But his diagram is said to be the original representation of that instrument—the ›low. It is simply a stick, with a branch or fork, one of which branches is harpened, and a limb is left to be used as a handle.

The plows in our own country in early times were almost as rude. Some f us can perhaps even remember the wooden mouldboard, chopped out with n axe. A little later we had a strip of iron attached, which was a step in nprovement. It was the old-fashioned *bull-plow*, a sort of shovel-plow, which ɜemed to do pretty good work in its time. You need not go beyond the ɪmits of your own State to find this style of plow. As we progressed in nowledge, the plow improved in style of manufacture, until, not to go into etails, we now have reached the perfect plow, so nicely made and fitly fash›ned, that it passes through the soil almost without resistance. Among the ıodifications of the plow are the trench-plow, the double Michigan-plow, the ang-plow, the object of which is to economize human labor. Then there is a tyle known as Dr. Grant's trench-plow. We have, also, steam-plows, with he object of saving horse labor, as the gang-plow economizes human labor. 'here is still another modification of the plow. I refer to the rotary spader, 'hich proposes to thoroughly stir and comminute the soil.

In considering the history of the plow, he showed that the progress from ıe rudest implement to the modern plow was very slow. He showed a diaram of a rude instrument used in Palestine for loosening up the ground, ›mething as a hog or mole would do. It is called the Caschrone, and is used › this day in some of the outer Hebrides in Europe. The wooden portion is

one single piece, and was doubtless selected on account of the natural crook in the timber. When the plowman wished to run his plow deeper he would raise up the handles on his shoulder; if his plow ran too deep, he pressed downward on the handles. This plow had an iron point. Mention was made of the Rotherham plow (supposed corruption of Rotterdam) at the commencement of the last century. It was a wooden plow, shod with iron. It entered the land on the principle of burrowing, rather than that of clean chisel cut.

Jethro Tull gave preference to the old Berkeshire plow, which was inferior to the last named in ease of management and ability to do work. He believed in "elbow grease." His plow was one with four coulters. He thought that this arrangement more thoroughly divided the land. But this implement was never generally used, and no improvement worthy of notice, from that time until the commencement of the present century, was made, when one of our own countrymen, Thomas Jefferson, had his attention directed to the improvement of the plow. He saw that the plow should be an instrument with power to act upon the soil vertically and horizontally. This would require a nicely fashioned curve. He had his plow put in operation on his own estate, where it worked satisfactorily.

The lecturer here stated that he would rather read from authorities on this subject than to present his own ideas. He accordingly read frequent and copious extracts from a work which he characterized as an exceedingly valuable one. It was the report of the plow trial at Utica, New York, in September, 1867, held under the auspices of the State Agricultural Society, and prepared by Hon. John Stanton Gould. The extract read had reference to the improvements made in the plow.

Two or three names mentioned in connection with the improvement of the plow, the speaker considered worthy of note. Mr. Newbold was the first American, after President Jefferson, to improve the plows in common use. He spent $30,000 in his efforts in this direction, and made the first American cast iron plow. He used the plow himself, but could not pursuade his neighbors to do so. They said it poisoned the land and promoted the growth of weeds! The patent for this plow was granted on the 26th June, 1797. From this time on, a great many patents were taken out for improvements, when, in September, 1819, Jethro Wood, of Scipio, New York, took out a patent for an improved plow, and from this pattern he never varied. Very many plows were made from patterns furnished by him, and even at the present day, in different parts of the country, there are plows made that differ very little from principles laid down by Jethro Wood. He was the first man who made a plow in three parts—the mouldboard, share, and landside. But the mouldboard was too full in the middle; it was not sufficiently concave. Measuring from the point of the mouldboard, the landside measured two feet and three inches long.

One of the next great improvements made was put forth by Withero and Pierce. The principal feature in this improvement was in the curve of the mouldboard. The object sought was to have a cycloidal curve. Samuel A.

Knox, of Worcester, Massachusetts, made an improvement worthy of note. Also, a Mr. Burrow, of New York, was another who was quite successful.

The great desideratum in a plow is not simply to turn over the ground, but it is to break up the soil as finely as possible in turning it over. We hear a great deal about spade husbandry, and it has this merit, that it does comminute the soil in a most thorough manner. We have many plows that do not break up the soil. These are not satisfactory. But again, we have plows—the double Michigan, for example—that do break up the soil in good style. I say double Michigan plow, because this is a plow having the right kind of a mouldboard for this work.

The lecturer next treated of subsoil plows, and gave a definition of subsoil. It is the *under* soil, the soil below the top soil. Suppose we have a plow that lifts a furrow twelve inches deep; now, if we wish to go still deeper, we use a subsoil plow, or trench plow. Dr. Grant has constructed a plow which is a true trench plow—a plow that throws up the under soil, and mixes it with the top soil. Dr. Grant claims that this is good practice. It may do for his soil, but there are soils where this will not do. It would be temporarily ruinous to bury up the top soil with cold stiff clay subsoil.

In deep plowing it is not desirable to plow too deep at once, but gradually to deepen the furrow at each subsequent plowing. In this way no bad effects will be experienced, but, on the other hand, a decided improvement in the land. I hope there are those here who can give us their experience upon this subject.

The subsoil plow proper is an implement that does not bring the under soil to the top, but simply breaks it up, and leaves it in its natural position. When this idea of a subsoil plow first entered the head of the inventor he thought it must be a turning plow, that it must have a mouldboard, and he proceeded to construct the plow upon this principle. It was thought that the plow was good for nothing unless it raised the earth into the air! The great objection to a plow of this kind was that it required too much power to move it—the draft was too heavy.

It was not until Prof. Mapes invented his plow, that progress in this direction was made. He invented a plow without a mouldboard—a plow which did not throw out the subsoil, but only loosened it, and left it in its proper position. The elevation of the earth was not more than two inches, so that the draft was comparatively light. The ground was loosened up so as to admit the air into the soil. This was all that was needed, and this was easily effected by this implement. I can entertain you better by turning again to our authority. [Here the lecturer read a long extract from the Report, elucidating still further the history of the plow.]

The great object in plowing is not only to reverse the soil, and to put the grass and weeds out of sight. It is to do this, and also for the sake of commingling the different portions of the soil together, and breaking it up by turning it over. The spade is a superior instrument for this work of comminuting the soil, and for this reason has advantages over the plow. In the process of digging the mingling of the soil is more thoroughly effected.

We will turn once more to our authority. The extract had reference to the objects sought in plowing. The object was not only to kill weeds, but to secure that condition of the soil enabling the roots of plants to readily permeate it in their search for food. He again commended the Report, from which he had made such copious extracts, as an exceedingly interesting and valuable document. It was prepared by one of the best minds of the country.

But after all the improvements made in the plow, the result obtained is not just what we want. The plow that will do good work in gravelly soil will not do on our rich prairies. After all the learning and skill and labor bestowed upon this instrument, the plow is a very unphilosophical tool. After having been brought nearly to perfection, and even giving satisfaction, it is still an unphilosophical instrument. And that is not the worst of it; while it remains what it is, and retains its present form, this must ever be the case. Since action and reaction are equal, there is and must be a great loss of power in this implement. We see this in the working of the plow. We see it in the condition of the soil beneath the plow—that condition which farmers call "furrow-trod," the ground becomes harder. For every pound weight lifted there is a pound exerted downward. The effect is known to all. Again, for every pound weight lifted, there is pressure of a pound upon the landside. The effect is apparent, and you will see the land *shine* after the plow has passed by. We live in hope of further improvement in that very useful tool, the plow.

DISCUSSION.

Mr. Dunlap—We have a plow, invented in this county, that is not liable to the objection of which Dr. Warder has spoken. But if there is any instrument, other than the plow, that is to come into use, and that will do the best service, I believe it will be Comstock's Rotary Spader. I have had hopes of this instrument, and some day may have them in use. It has already been put in use in this vicinity, on seven or eight hundred acres, and in certain conditions of the soil works well. When we underdrain our soils I think we shall find the rotary spader a very desirable instrument for stirring and comminuting the soil. Until that day does come, until we will drain our lands, so that we can work a dry soil, we will not be able to work the spader satisfactorily, for the reason that, on wet soils, it would sink, from its great weight, into the soft ground.

It seems desirable that we should have plows on wheels, in such a way as to carry a man. Then we can put upon these plows the maimed soldier, the boy of 12 or 14 years, who is not strong enough to work day after day. Even the invalid could be put upon it, and made to render valuable service. But the objection

is the expense. They cost from $60 to $70. Still their use is economical in the way I have mentioned, besides they break and mix the soil together, like a garden cultivator, and as a result, we have an increase of the crop, and the great satisfaction of working with good tools.

Dr. Warder—I would like to know if any one present has tried to use the rotary spader, and with what result.

Mr. Dunlap—It has been tried in this county, and we find, from its great weight, that it mires in soft ground. On dry soils it has done good work.

A voice—It weighs 900 pounds.

Mr. Dunlap—In regard to deep plowing, or trench plowing—a subject introduced in the lecture—I believe that deep plowing, on most soils of our prairies, produces the best crops. We find that trench plowing brings good crops. I suspect that chemistry has something to do with this. There are soils which might not be so much benefited by deep plowing. He referred to Mr. Alexander, the "big farmer," who plows eight inches deep, with good results.

Mr. Lovell had some experience in this matter, and spoke of the practice of Mr. Sullivant, now of Iroquois county, who plowed but eight inches deep, and obtained crops of corn, 60 bushels to the acre.

Mr. Dunlap—The soil on Mr. Sullivant's farm is, perhaps, different from ours. It is more arenaceous, is it not? A soil of this description would bring large crops without very deep plowing.

Mr. Lovell—No, it is not such a soil as you speak of. It is very much like our soil here, I think. Perhaps it is a little more gravelly, otherwise it is much like the Champaign county lands, where the land is high.

Mr. Gardener—I am well acquainted with one of Mr. Sullivant's foremen, and had a talk with him not long since. He stated to me that all the land that he tended yielded from 50 to 60 bushels to the acre. Some of the land was high, and some low. Take the land as it runs, I think it is much like our land.

Prof. Bliss—I have had some opportunity of observing, and also have had some little experience in this matter of trench plowing. So far as my observation goes, it has been that crops on ground not trench-plowed succeed very well if the season is favorable, but if the season is a little dry, the crop suffers, and perhaps dries up, when, *if the ground* had been trench-plowed to the depth

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of seven or eight inches, the drouth would not have produced so damaging an effect.

Mr. ROBINSON, of Tazewell county, prepared a hundred acres of wild prairie land, and planted to corn, and obtained 75 bushels to the acre. The sod was turned over to the depth of eight inches, and turned over in such a manner as to leave holes for the air to enter, which rotted the sod much quicker than would have been the case had the sod laid down close. After the plowing, the harrow was put on. It requires considerable time to pulverize the soil sufficiently. The yield on this occasion was very satisfactory. This past season I put in a few hundred acres, on drained land, in a similar manner. The prairie was raw enough to cut a good crop of prairie grass. The soil was a little more sandy, but not black sand. The season was extremely dry, and we obtained but 40 bushels to the acre. I have every reason to believe that had the season been wet, we should have gathered 60 bushels to the acre.

Mr. FANGENROTH, of Madison county—I wish to make some statements with reference to the common mode of plowing in lands, always and forever throwing up the ridges along the outer edge of the field, and in so far scooping out a basin for water in the central portions of the field. These *dead furrows* necessitate a great loss of land.

He deprecated this method of plowing, and proceeded to describe his method. He begins in the center of the field, whether of five, ten or twenty acres, strikes his furrow, stops short of the end of his row, (distance across the field,) and then back-furrows, and continues to back-furrow till the work is done—turning *gee* if his plow is right-handed, and *haw* if a left-handed plow. This leaves the plowed surface level, throws the soil continually inward and away from the fence corners, where it is especially heaped up and *kept dry* in the old system. Another advantage in this new method. The horses do not turn on the plowed ground (but upon the unplowed) and injure it by trampling.

Mr. ROBINSON was not in favor of riding-cultivators. He had not succeeded with the gang-plows. He thought that almost all those who had given it a thorough trial had discarded it. It might answer a good purpose for that class of men—maimed soldiers, boys and invalids—of which Mr. Dunlap has spoken; but the machine is too heavy, and the weight of the driver only adds to

the difficulty. There may be gang-plows that work well, but I have not seen them.

Mr. Periam—But the weight of the man would not add 150 or 200 pounds to the draft of the plow.

A voice—Have you ever put in a crop with the gang-plow?

Mr. Periam—I have not. I was only speaking of the popular objection as being no very serious matter, after all.

Mr. Osborn—I have used the gang plow, and do not like it. I have tried it for the whole season through, and still I do not like it, and I don't want to try it any more. It will kill the horses.

Mr. Robinson—I have seen hundreds of acres plowed with the gang-plow, and have always found the horses poor at the end of the season. Besides, four horses do not work well abreast. Yet I hope there may be some improvement in the gang-plow, for I much prefer to ride.

GRASS.

A LECTURE BY DR. L. D. MORSE, OF ST. LOUIS.

The subject assigned me on the programme is "Grass." Some of you, I presume, probably most of you, think that it is a small subject, and comparatively unimportant. Certain it is, that farmers in general bestow much less thought, care, study or science, on the grass crop than they do on the grain crop. How many farmers know the names of the grasses which are growing in their fields? Not one in ten thousand. Many of them seem to be scarcely aware that they have, or need to have, any other varieties than timothy, blue grass, clover, and rarely a little red-top; and of course they do not understand the peculiar properties and relative values of the different species, and their adaptation to various soils and conditions, and for various purposes.

Instead of my subject being of minor importance, I suspect that it would not be difficult to show that it is by far the most important of any subject that has been or will be brought to your attention during the present course of lectures. In order to present a few of the prominent features of the subject, I propose to consider,

1. What is grass?
2. The importance of grass.
3. How to grow grass.
4. Some of the varieties of grass.

WHAT IS GRASS?

1. Grass is the most common herbage with which the earth is clothed; giving us the "grassy banks," "wavy meadows," "sweet fields arrayed in living green," and the "green things growing," of which poets have sung

from time immemorial. Grass is so common, so extensive, so beautiful, so essential in the landscape, and important to the welfare of mankind, that scarcely a poetical production of rural character can be found in which allusion to grass is not made.

The family of grasses, in botanical language the *Gramineæ*, embraces nearly a sixth part of the whole vegetable kingdom. Most of the grains, as wheat, rye, corn, barley, rice, etc., are true grasses. In common speech these grains are not recognized as grasses, while some other plants, such as the clovers and lucerne, are familiarly called grasses, but are not entitled to the appellation, belonging as they do to quite another family, the *leguminosæ*.

The grasses may be described as plants having a cylindrical, jointed stem, the nodes being solid and the intervening joints hollow, or filled with a pith-like substance; the leaves long, narrow, not serrated at the edges, having parallel veins running along on each side of a prominent central vein or mid-rib; the leaves alternate, one of them originating at each joint, embracing the stem with its base, and forming a sheath, which is slit down on the side opposite to the leaf to its origin; and the flowers are protected by a peculiar kind of calices called glumes or husks.

Guided by this description, it will not be difficult to recognize the true grasses wherever found, and it is readily seen that the grains mentioned belong to the grass family. It will suit our present purpose best, however, to leave the grains out of consideration as grasses, and to include the clovers among the grasses, as they are, to a considerable extent, so understood, and used for the same purpose.

A forcible and expressive definition of grass is that given by a French writer, who says that the term grass is only another name for beef, mutton, bread and clothing. A short and comprehensive definition is that of scripture, "all flesh is grass." A well known New York author, in an address at an agricultural fair, a few years ago, said:

"Grass is king. It rules and governs this world. It is the very foundation of all commerce. It is the most important crop ever grown upon the face of the earth. Without it the earth would be a barren waste, and cotton, gold and commerce all dead. Grass is the all in all to all men. No wonder then that he has always been considered a wise man who said, 'He that maketh two blades of grass to grow where only one grew before, is greater than he who buildeth a city.' That is, builds a mart of commerce—a storehouse for cotton—a place of deposit for gold."

IMPORTANCE OF GRASS.

2. The importance of grass is already quite well indicated. It is found growing throughout the world, in all places where vegetation of any kind can grow, and where grass is not found, there is found the most absolute desert—the most entire absence of the means of supporting life of any kind. Other families of plants are restricted to narrow belts of latitude, but the grasses everywhere spring up spontaneously, adorning the earth with refreshing verdure, and affording the chief means of subsistence for almost the whole animal creation.

An all-wise Providence has wonderfully provided for the propagation of this class of plants. The seeds are small, light and easily transported from one place to another. The roots are creeping or fibrous, and send forth many shoots which quickly cover the ground; and by the yearly decay of the stems and leaves a constant supply of decomposing matter is afforded for the nourishment of future growth. Most of the grasses are perennial, and although the leaves and stems be cropped and destroyed, they are soon reproduced. The creeping roots, though bruised and hurt, are not destroyed, and the winter's cold and summer's drouth are alike unable to extinguish the principle of life in these most important of all plants to mankind.

The great value of the grasses is further signified by the wisdom of Providence in the great number and variety of the species which he has created. There are no less than three thousand distinct varieties known and described by botanists. Thirty varieties have been counted in a single sod taken from a rich natural pasture. Mr. Flint, author of "Grasses and Forage Plants," describes one hundred and twenty-five varieties growing in the state of Massachusetts. In the Natural History of New York, Prof. Torrey describes forty varieties of the genus *Poa*, twenty-seven of *Agrostis*, six of *Alopecurus*, fifteen of the *Festucas*, and thirty-four of other varieties, amounting in all to one hundred and twenty-two varieties existing in the state of New York.

Six tenths of the whole cultivated area of the state of New York is occupied by grass; and the annual value of this crop may be fairly estimated at $75,000,000; an amount fully equal to, and probably exceeding, the value of the entire grain crop of that state. Where, within the United States, can be found more beautiful or more wealthy localities than in the best grass-growing districts of New York? How often do we hear the remark from men who have traveled much and observed closely, "wherever you find a good grass farm, you are sure to find wealth and prosperity." Mr. Samuel L. Boardman, of Maine, has written as follows: "A district of country which is exclusively or mainly a natural grass-growing section, has within itself all the elements of successful agriculture, provided its operations are conducted with system and economy. With grass we have all kinds of stock; with stock the means of working and dressing our farms, furnishing our tables, providing our clothes, and all else that is desirable or necessary. A county having a soil naturally adapted to grass, is, in a great measure, able to live within itself, and not be dependent upon an exchange of commodities with other districts. The same is true, though in a less degree, upon a single farm. If the soil is natural to grass, strong and moist, the farmer has at hand the means to secure whatever he desires; or, to apply the old proverb, he has corn, cattle and manure. In fact, grass and stock husbandry is really the only branch of farming which seems to render a man independent."

A committee of the Maine Board of Agriculture, reported to the board in 1864, as follows: "We have no hesitation in saying that the hay crop of our state is far the most valuable and important crop that we produce, and generally all our farm operations, particularly in the older portions of the state, should be conducted with a view to increase the fertility of our grass lands, and augment the hay crop. We believe that the thrift of those who attend

to farming exclusively, and who pursue a mixed husbandry, as do most of the farmers of this state, may be very correctly estimated by the amount of hay they cut."

Scores of such opinions as these could be given, and there are ample facts to prove that they are well founded. If so, then it is evident that the most serious and radical defect in our Western agriculture is, that too little attention is paid to growing grass. It is a defect that is becoming year by year more serious, and unless a change in our system of farming is inaugurated, the utter impoverishment of a very large portion of our beautiful and naturally fertile country is merely a question of time. Indeed, a number of counties in the State of Illinois are already measurably worn out and exhausted by bad management, and chiefly by the continual cropping with grain.

Illinois is claimed to be the best agricultural state in the Union. It has been called a great cattle raising state. Statistics show that it is most emphatically a grain producing state. Illinois produces annually over ninety bushels of grain to every individual of her population, while the state of New York produces only about nineteen bushels to each individual of her population. New York is a wealthy and very prosperous state. In her agriculture, I think it will be generally admitted that she is in advance of any other state in the Union. Her farmers generally pursue their calling with as great a degree of intelligence and success as the farmers of any region on this continent. It becomes an interesting inquiry then, in what consists the prosperity of New York, while she produces but little more than a quarter as much grain in proportion to population as Illinois.

In comparing other products the proportion cannot be so readily adjusted as with grain. Illinois is larger than New York in area, by some ten or twelve thousand square miles. The population of New York numbers a little more than twice as much as Illinois. According to the census of 1860, Illinois raised considerably more than twice as much grain as New York, the figures being 156,219,448 bushels in Illinois, to 72,890,861 bushels in New York. Illinois produced 1,774,554 tons of hay, to 3,564,786 in New York, or about half as much. There are more acres in pasture in New York than in meadow. In 1865 the figures were 4,296,720 acres of meadow, and 5,819,694 acres in pasture. If the yield from the pastures is worth as much as the yield from the meadows, then the grass crop produces more money probably than the grain crop in New York state; while in Illinois, estimating by the same rule and at the same rate—which is much too liberal—the grass crop is not worth half as much as the grain crop. In 1860 the live stock in Illinois was valued at $72,501,225; in New York, at $103,856,296. Illinois had 522,634 milch cows, while New York had 1,123,624.

It appears that in all products from grass, New York is largely in excess of Illinois; and yet not very much in excess of her own grain crop in value. She practically recognizes the old Belgian proverb, "No grass, no cattle; no cattle, no manure; no manure, no crops."

It appears evident, also, that the farmers of Illinois depend for their profits chiefly upon growing grain. This is sent away to market; most of it *finds its* way to the Eastern States, and not a little of it goes eventually to

enrich Eastern grass farms. Of course it brings money to our farmers, though it is doubtful whether it brings as much for the time being as grass would; but the most important point which should be considered is the end to which such a course inevitably leads—such a continual sending away of the wealth of the soil never to return.

You have all heard of the peasant who possessed a goose that every day laid a golden egg. This small supply of gold was sufficient for the daily wants of the peasant and his family, and their only care was to preserve the life of the remarkable animal from which they derived their support. But at length the peasant, stimulated by unnatural desire, required more gold, and unwilling to wait the tardy operations of nature, cut open the body of the goose to obtain the coveted treasure, and thereby killed the animal and lost his means of support.

The soil is the goose that annually lays a golden egg in the lap of the farmer, and will continue to do so to all time if properly fed and tended, but the practice of many of our grain farmers will as surely starve and destroy the goose as did the knife of the peasant in the fable.

The preservation of the fertility of our soils, and the profitable and even increased production of the cereals, both of which objects may be secured by the growing of grass extensively, and by the manure resulting therefrom, are certainly matters eminently important and worthy of our consideration and study.

"The effect of grass on the growth of the cereals is well illustrated by a comparison of the agricultural statistics of France and England. France has fifty-three per cent. of its cultivated area under grain crops, while England has but twenty-five per cent.; but in grass and meadow, the natural food of live stock, England has fifty per cent. and France has only twenty-two per cent. You may be surprised to hear, that notwithstanding the enormous disproportion of area of grain land, England produces 5 1-9 bushels of grain for every individual of her population, while France produces 5 ½ bushels for every individual of hers. Thus the production of the former is within seven-eighteenths of a bushel of the latter to each head of her population. How is it that England is so nearly on an equality of production with France, while her cultivated area is very much inferior? The answer is plain. It is on account of the manure furnished by her grass lands. Every acre of English grain land receives the manure from three acres of grass, while in France the manure from each acre of grass must be diffused over two and a half acres of grain. Let not the eloquent teachings of these plain statistical statements be lost upon us. Let us ponder them carefully when contemplating the splendid rewards which nature offers for a thorough obedience to her laws." (Address of J. Stanton Gould.)

HOW TO GROW GRASS.

3. It is not the simplest thing in the world to grow grass with complete success, though judging from the examples most commonly seen, it might be presumed that it is generally so considered. Without going very much into

the details of grass growing, I wish to mention a few essential considerations, most of which are too commonly neglected or overlooked.

First, underdraining, on a large portion of our lands, is essential in order to secure the best results in grass.

On all heavy soils, with retentive clay sub-soil, that hold the water that falls until it evaporates, and on such lands as are full of springs, the grass crop will be doubled, on an average, considering quality and quantity, by underdraining. It deepens, ærates, warms and enriches such soils in a wonderful degree, making them capable of withstanding the effects of cold, wet weather, and especially it enables them to go through the long, scorching drouths without material injury to the crop of grass. It is expensive, but when well done will last a life-time, and the increase in production will very soon pay the cost.

In the second place, it is essential that the ground be properly prepared for the reception of the grass seed. It should be smooth, in fine tilth, and free from weeds and foul growths of all kinds. We rarely find a pasture or meadow that is not more or less filled or infested with noxious weeds or worthless grasses. These occupy and take the strength of the land, continually encroaching upon the valuable grasses until the pastures, and especially meadows, become almost worthless from the abundance of "white weed" and other trash. He is not a successful grower of grass whose pastures and meadows are thus infested.

Plowing in midsummer, the summer fallowing as sometimes practiced, puts the land in good clean condition for seeding to grass in August or September. A crop of sowed corn may be grown to the height of a foot and a half and then turned under with the plow, if desirable, affording manure and clean land for seeding, Sowing grass seed upon oat stubble, as I have found it practiced in this immediate vicinity, I think must be an excellent plan. The oats, if sown in February or early in March, as they must be to succeed well in this latitude, and especially south of this, get an early start, and quite effectually choke out most of the weeds. Then, if the grass seed be sown on the stubble early in September, either with or without harrowing, it gets a good start before winter, and the oat stubble and the young oats that start from the seed scattered in harvesting, afford some winter protection to the young grass. Good success is sometimes obtained by seeding to grass in February or March, but is generally considered much more uncertain, and so also is the practice of sowing grass seed with grain.

These hints in regard to preparation for seeding, apply generally to meadows, and in most cases to pastures. Circumstances alter cases. There are hill lands that may be properly seeded to grass as soon as cleared, without plowing even, and kept constantly in grass. Weeds, sprouts, etc., may be killed out of such pastures by mowing or cutting out, or much better by pasturing with sheep. Our unbroken prairies may be seeded with grass, and thus converted directly into better pasture or meadow than they were before; and in a few years the tame grasses will almost entirely take the place of the wild.

One very important cause of lack of better success in growing grass is that farmers do not sow varieties enough. This is true in more than one sense. Different varieties should be chosen for different objects, for difference in season of ripening, and different soils. Again, a mixture of varieties should generally, if not always, be sown.

Some of the grasses flourish on dry sandy or rocky soils, but perish in wet soils; others grow vigorously in wet soils, but die in drier ones. Some will only flourish on alkaline soils; some require excess of potash, others excess of light. Some are adapted to the sunlight, others love the shade; some are valuable for hay, but not for pasture, and vice versa. One species abounds in that kind of nutriment which enlarges and strengthens muscles; another, ill adapted to nourish the muscular tissues, will lay on fat rapidly; another which is deficient in both these respects, is rich in those elements which support respiration and furnish the fuel for the production of animal heat. Certain varieties are highly valued for making a superior quality of butter. It seems very evident that in the judicious selection of different varieties of grass, to occupy different localities, and to subserve different purposes, a wide field is afforded for the application of physiological, botanical, geological, meteorological and chemical knowledge. It is the province of practical agriculture to find out the peculiar qualities of each variety, and to place each in the locality and under the circumstances most favorable for its most profitable development.

We should sow a mixture of varieties, for several reasons; one is that it is an object to produce as much good herbage from the land as possible, and at various seasons; another is the importance of occupying the ground as completely as possible with valuable grasses, so that noxious weeds and worthless grasses will have no chance to get a foothold. It is an established fact, and one easily demonstrated, that one or two varieties will not perfectly occupy any soil. This is the rule, to which there may be exceptions. Different soils vary in the number of plants of a certain variety that they are capable of maintaining; yet, on any soil, however thickly the seed of a variety may be sown, only a certain portion of the plants will live; the rest perish and leave vacant spaces of soil, which eventually become occupied by foul grass, weeds or moss, more or less to the detriment of the grass crop. Therefore, by neglecting to sow a sufficient number of varieties, we fail to obtain a full yield of grass, and what we do obtain is deteriorated by the mixture of weeds, the tendency of the latter being to increase and encroach upon the grass.

Mr. Flint says, "I hold this proposition to be indisputable, that any soil will yield a larger and more nutritious crop if sown with several kinds of nutritious grasses, than when sown with only one or two species. Indeed it is a fact, well established by careful experiment, that a mixture of only two or three species of grasses and clover will produce a less amount of hay than can be obtained by sowing a large number of species together. There may be some exceptions to this rule, as in the cases where the yeld of timothy and red-top, owing to the peculiar fitness of the soil for them, is as great as can stand on the ground where they grow."

Mr. Flint gives several lists of mixtures recommended for pastures and meadows, varying in number of varieties from nine to sixteen. In all natural and old pastures we find quite a number of varieties of grasses growing together in all cases. This is nature's plan for completely occupying the soil, and every farmer who observes carefully will be convinced that it is an essential point of success in grass-growing.

One more essential consideration in regard to success in growing grass, I will mention lastly, though not by any means of least importance, namely, the planting of trees, and the preservation of forests. Every pasture should have upon its borders, and upon the highest points, a sufficient number of trees for the comfort of stock, especially to protect them in the heat of the day from the scorching sun. Meadows may be bordered by trees, and a few scattering ones in the field will not be badly out of place. But these are minor considerations compared with the importance of growing and preserving trees for their ameliorating influence upon the climate. One of the most serious obstacles in the way of successful grass-growing is the long and scorching drouths to which our country seems to be more and more subject.

"The researches of modern science," says Professor Kedzie, of Michigan, "accurate and careful observation, as well as the history of the past, show that a country abounding in forest is more moist, has a more copious and equable rainfall, abounds more in springs and streams, and, in consequence of all these, is more exempt from great and sudden fluctuations in temperature, from late frosts in spring and early frosts in fall. Thus Egypt, from earliest periods of history, has been spoken of as a rainless region; but since Mahomet Ali has made his immense plantations of trees, showers have become frequent. The controlling influence of forests over rainfall is also shown by the fact that countries once supplied with forests, and having abundant rains and immunity from frost, their forests being destroyed, have been scourged by drouth and frost till the forests were restored, when they once more became fruitful; or, if the inhabitants would not restore their protecting forests, the stern hand of famine threatened to wipe out a race that would not reverence the order of nature. Thus the Cape De Verde islands, so named from their greenness, have been stripped of their forests by their improvident inhabitants, since which time they suffer terribly from periodical drouths; sometimes no rain falling for three years at a time, and 30,000 inhabitants, or one-third of the population, have perished. Thus famine cuts down the inhabitants as pitilessly as they cut down the protecting trees."

Abundant evidence can be found in our own country in proof of the favorable influence of forest upon the climate. There cannot be one present who has not vivid and painful recollections of long periods when the pastures were as heaps of dust, and when every living thing seemed in danger of famishing almost for want of a green thing to eat. It is safe to say, that in one hundred years from now, unless more attention is paid to tree planting and the preservation of forests, the farmers of this region will not be able to make a living from their lands.

SOME OF THE VARIETIES OF GRASS.

4. The importance of studying the varieties of grasses has already been stated. It is a subject of too great magnitude to admit of being thoroughly presented at this time. A few prominent features only, in regard to the varieties and their uses, will be presented.

The importance of using a mixture of varieties in seeding to grass has been stated. We should also seek to stock our pastures, and especially our meadows, with the most nutritive grasses. To aid us in this respect, we have the experiments of Mr. Way, the chemist of the Royal Society of England, who has given us an analysis of twenty-one varieties of grass, and has thus disclosed to us, as well as chemistry can do, their relative values for feeding to animals. These experiments constitute, probably, the most valuable contribution which chemistry has ever made to agriculture. From these experiments we learn with surprise that one hundred pounds of quaking grass will give 28½ pounds more of dry hay than one hundred pounds of vernal grass; that it will require 237 pounds of vernal grass to supply an animal with as much muscle-making matter as is afforded by one hundred pounds of Timothy. It will take 319 pounds of soft brome grass to lay as much fat on an animal as 100 pounds of timothy would do. One hundred pounds of timothy will support the respiratory process as long, and afford as much animal heat, as 260 pounds of vernal grass. Chemistry teaches us, what every observing farmer knows, that timothy is the most valuable grass that we have, especially for hay. It is much to be regretted that further experiments like those of Prof. Way have not been made, and also that the chemical results have not been thoroughly verified by actual experiments at the manger, conducted with care and precaution to guard against mistakes. Such investigations, regarding the nutritive value of the different species of grasses, would help to determine important questions relative to agricultural profits.

In the next place we should select varieties for our meadows with reference to their period of ripening. It is often, if not generally, important to have the meadows of a farm come successively to maturity, and with this end in view, we should sow such varieties together as flower at the same period. Hay is most nutritious and most palatable when cut at the period of flowering. I am aware that this is to some extent a disputed point. There are many farmers, especially in the West, who believe that timothy should not be cut until it is ripe. They say that it gives more weight of hay when left until it is ripe, which is doubtless true, but that its value is thereby lessened, there is scarcely room for doubt. Chemical analysis, and the practical trials of the best farmers in the oldest grass-growing regions, concur in showing that the period of flowering is the best time to cut grass for hay, having reference to its nutritive value. At this time it contains more starch, sugar and albumen, which can be assimilated by animals, than at any other period; after this, these substances are converted into woody fiber and other compounds, which cannot be favorably acted upon by the digestive organs, and are, therefore, wasted. If reference is had to the best authorities in this country or Europe, it will be found that they all agree in considering this an

established principle. At the discussions held during the New England fair in September last, this subject came up, when very many of the farmers of New England, where grass is the leading crop, most emphatically urged the importance of cutting timothy at the flowering period in order to secure its maximum value. Considering this point established, it follows that great loss must be sustained by cutting together those grasses which flower at different periods. If cut when the earlier grasses are in the proper condition, the later ones are watery and innutritious. If cut when the later grasses are in flower, the earlier have passed into woody fiber and other insoluble compounds. We see an example of this want of fitness in the practice, common all over the country, of sowing timothy and red clover together, the clover being much the earliest.

If orchard grass and red clover are sown together, a much better crop for early mowing is obtained. Again, it follows, with farmers who have a large quantity of meadow, that if they are restricted to one or two varieties, great loss must be suffered for want of help sufficient to cut it all when in its best condition, the period of flowering; and every day that it stands after this diminishes the nutritive value. To prevent this waste, meadows may be so divided, and such varieties selected, as to have part come to maturity in June, another part in July, and the remainder in August.

In regard to grasses for pasture, the case is quite different. The period of flowering of the different varieties in the pasture should differ as widely as possible. It is important to have those varieties which will afford the very earliest growth of herbage in the spring, and then to have a constant succession coming to perfection in every month from spring to fall.

I will not weary you with descriptions of varieties of grass, but will name a few which may be considered as adapted to the various purposes alluded to. In order to obtain a succession in meadows, on the principle pointed out, the following varieties may be taken for a beginning:

For early mowing, and for light sandy lands.—Orchard grass, red clover, annual spear grass, meadow foxtail.

For later mowing, and for clayey and calcareous loams.—Timothy, red-top, crested dog's tail, tall fescue, hard fescue, Italian rye grass, and oat grass.

For latest mowing, and for clayey lands.—Wire grass (*Poa campressa*), and foul meadow (*Poa scrotina*).

These different mowings will occur in the months of June, July and August, later or earlier in the months, according to latitude.

For seeding lands for meadows or pastures, a few leading varieties may be mentioned as adapted to different soils.

For sandy soils.—Lucerne, though a legume, and not a true grass, is admirably adapted to sandy soils resting on porous subsoils; meadow foxtail, orchard grass, Italian rye grass, hard fescue, tall oat grass, meadow soft grass, and the red and white clovers.

For calcareous loams—especially adapted—Kentucky blue grass, timothy, and annual spear grass.

For tenacious clays.—Perennial rye grass, crested dog's tail, red-top, wire grass, and tall oat grass.

For permanent pastures, with a view to securing a succession in the time of blossoming, covering as much of the season as possible, Mr. Flint recommends the following mixture, giving the number of pounds of each for an acre:

Meadow foxtail,	flowering	in May and June,	2 pounds.
Orchard grass,	"	" "	6 "
Sweet-scented vernal	"	in April and May,	1 "
Meadow fescue	"	in May and June,	2 "
Red-top	"	in June and July,	2 "
Kentucky blue grass	"	in May and June,	4 "
Italian rye grass	"	in June,	4 "
Perennial rye grass	"	in June,	6 "
Timothy	"	in June and July,	3 "
Rough stalked meadow	"	" "	2 "
Perennial clover	"	in June,	3 "
White clover	"	from May to Sept.,	5 "
			40 pounds.

This gives us forty pounds of seed for an acre, and twelve varieties; and would give, according to Mr. Flint, over 54,000,000 seeds! "In an acre," he says, "there are 6,272,640 inches, so that the mixture would give about eight seeds to the square inch." This he considers a very large and liberal seeding, allowing a large margin for worthless seeds, for imperfect sowing, and for destruction of plants by insects and frost.

In conclusion I must say that I have sincerely regretted having had at my command so little time—merely odd hours snatched from other duties—in which to prepare a subject of such primary importance to our agriculture, and in regard to which there is so much need of awakening more interest among Western farmers. If, however, I have presented facts and thoughts sufficient to induce any farmer to study the subject who has heretofore neglected to do so, he will probably supply himself without delay with such a work as "Flint on Grasses," where he will find very much of what I have stated in this lecture, and a vast deal more, of the greatest importance for him to know. It has been wisely said, that he who makes two blades of grass grow where but one grew before, is a public benefactor. I have at least made an effort to accomplish something in that direction, and I hope that each of you will become public benefactors by contributing to double the amount of grass now produced.

DISCUSSION.

Mr. Freeman, of South Pass—I would like to ask the Dr. a question. Whether there are two species of red-top?

Dr. Morse—No, sir; I think not. We find that grasses vary greatly, according to the soil in which they grow. If upon thin soil, it does not grow more than one and a half feet high. If on rich soil, it grows large, and the general appearance is such as leads one to suppose that there are two varieties of red-top, when there is but one.

Mr. Dunlap—There were one or two points in the lecture that struck me with force, and some statements made that I would not like to have go out without explanation, and which seem to be indorsed by the speaker. I understand him to recommend sowing forty pounds of mixed grass seed to the acre. Now, if we look at it in the light of dollars and cents, we find that the expense is great. This gives no encouragement for commencing grass culture. Now I think a much less quantity of seed is sufficient. I find that four quarts (of timothy?) is better than three pecks, if properly sown. We can dispense with three-fourths of the quantity named. It is the practice of some to sow in the spring, with other grain, especially with oats.

The gentleman tells us that timothy is the most valuable of the meadow grasses, yet he tells us in conclusion that June grass, mixed with timothy, is equal to timothy and oats. I suppose the gentleman can explain this. Let us understand this matter. We know this June grass under the name of Kentucky blue grass. It is not especially adapted to calcareous soils. It is known in New England as June grass. It is known in Ohio as June grass (*Poa compressa*). The question as to whether it is profitable grass in the meadow, is not doubtful. It is indiginous to this country, and makes good pasturage. We can make just as good butter and milk as Orange county, New York.

Dr. Morse—In reference to the points stated by the gentleman who has just taken his seat, I would say farmers generally sow too little grass seed, and I would prefer to recommend too much rather than too little. In my practice I sow more than my neighbors do. I wish to have the ground completely covered. Thick sowing does no harm. In regard to the cost, I believe every farmer raises his own grass seed, or ought to do so. Many varieties he cannot buy. Besides, if he sows his own seed he knows what he is getting. If he buys his seed, he does not know what he is getting; he not unfrequently gets weeds. If the farmer will save his seed he will avoid the cost and be sure of pure seed. In the experiments of Prof. Wade, timothy is the best for hay, and blue grass the best for pasture. He read extracts from authorities on this subject, indicating the difference and comparative value of Kentucky blue grass and June grass, the one having a hollow stem and the other being solid. Working horses can not be kept on this ? grass.

Mr. Dunlap—Is there not here a reference to green feed alone?

Dr. Morse—I think there is.

Mr. Dunlap—That will explain it.

Mr. Periam—I think theories and facts are both valuable, but facts are better than theories. In regard to the difference in these grasses—that which is known in the East as June grass and Kentucky blue grass. That there is a difference in these two grasses I receive as a fact. In New Jersey, where I was raised, this so-called wire grass, or June grass, is worth double that of timothy, especially for what are called fancy stock, and raising of horses. In reference to thick and thin sowing, I would say half-bushel to the acre was enough.

Mr. Scott—I have some little experience in this matter. I was born and raised in the state of Kentucky, and came to this State some years ago. I noticed a difference in these grasses, and I frequently asked persons if there was a difference. There was evidently a marked difference in the appearance of them. Afterward I sent to Kentucky and bought seed and sowed it, and also sowed the seed saved from the farm, and there was a very marked difference in the quality of the two grasses. As to the quality of the Kentucky blue grass, I think it is, for grazing purposes, unsurpassed.

Mr. Robinson—For hay, I find nothing better than timothy, clover, and, on low land, red-top. As to the quantity of seed, I should say one bushel to the acre, if the ground is properly prepared. This will give a seed to every square inch, which is enough. Also, in reference to the different kinds of grasses, I think there are three varieties similar to the blue grass—one of larger growth, another of smaller growth, and a third which stays green all winter. It does not exceed six inches in height. We find a considerable of it along the Illinois river. It is worthless as hay, but good for pasture.

Mr. Freeman—I got hold of Mr. Talpa's little book, "Chronicles of a Clay Farm," about ten years ago. I took particular notice of what he said about the different kinds of grass, and the soils best suited to each. I then made a selection of six or seven varieties, those which I thought best adapted to my soil, mixed them together, and sowed the seed with the best results. I had a magnificent growth. In this mixture I had Kentucky blue grass,

orchard grass, red-top, red clover (I did not put in any timothy), sweet scented vernal grass, and some other varieties.

In regard to the time of sowing, I think the spring is best with us, owing to the heavy action of the frost. Our soil is not as moist as that of Central Illinois. We prefer to prepare the soil in the fall and sow in the spring, say in February or in March. Last summer, along the banks of the Big Muddy, in Williamson and Jackson counties, I saw fine fields of red top—forty-acre fields of red-top—presenting a fine growth. In a few instances timothy grass was seen, but chiefly red-top. I found no one to talk about it and give me information. The subsoil in particular is much the same as Cobden Ridge, but the situation is especially favorable to the growth of this grass. The soil there is, I think, always moist. It is certain that it was, in the early part of the season, excessively wet.

Mr. Dunlap—In relation to this quantity of seed, I would like to have it understood as to what is the proper quantity. Take it for granted that a man can raise his own grass seed—and he *can't* do it—I still think it would be better to use one-fourth the seed, and sell the balance. The difficulty is the sowing is not properly done. The seed is scattered upon a half-prepared soil and covered too deeply. I protest against the very common mode of sowing grass seed. It is not good farming. Grass seed, buriedone inch in depth will never germinate, but if properly done every seed will germinate. The land should be well plowed and then rolled, the seed sown and again rolled. This will cover the seed to a sufficient depth, and I will guarantee that one-fourth the quantity of seed will make a better stand than the whole sown in the ordinary way. This method also commends itself in that it is less expensive.

Another word in regard to the Kentucky blue grass and its identity with our June grass. I have the statements of good judges that, when grown side by side, they were to all appearance identical. The only difference I can see is, that we find in the one ergot or smut, and do not find it in the other. I have never seen ergot in the wire grass (*Poa compressa*). There are doubtless three kinds, or more, of grass upon this park. There is more or less of red-top, and several other grasses I do not know, and among them are some of the wild grasses. I am satisfied *that* the best seed comes from Kentucky, and this will account for

the seeming difference as to variety. The subject needs further investigation and trial, which we expect will here be given to it. This institution has a thousand acres of broad prairie, upon which we expect to test the value, not only of grasses, but of many other things.

Dr. WARDER—This question with regard to these grasses goes to show how intelligent farmers may aid us, by their observations, in arriving at truth. Yet we may derive much aid from scientific research in a direct line. I am happy to learn that there is a memorial, asking the Legislature of this State to provide for a Botanical survey of the State. This question would be answered in a moment by one who had made the survey. One observation could not furnish the data upon which to base our conclusions.

The Kentucky blue grass is undoubtedly the same botanical plant (*Poa compressa*) as the June grass of New York and the spear grass of Pennsylvania. For pasture it is very highly valued; so much so that meadows where this grass abounds are often, after three or four years, turned into pasture. It is very difficult to cut this wire grass. I once asked a farmer if he knew this grass. He shook his head suggestively. He did not *want* to know it. "We call it," he said, "wire grass; when you strike your scythe into it you will almost fall over." But this grass is extensively used in Ohio as pasture, for which it is very valuable. It is a common saying in Pennsylvania that a pound of blue grass will make an ounce of beef. I hope something will be done in the way of obtaining a Botanical survey.

Mr. PERIAM—I wish to call attention to one more point. I have always held that the grass crop was an important and profitable one upon the farm. One-half the farm should be in grass—in pasture and meadow—and the grain raised should be fed upon the farm, for the reason that the manure may be put back upon ground. This is a fundamental principle in English husbandry. We know that the grasses and the turnip crop have done everything for the English soil. They have increased the productiveness of their farms one-half within the present century. I wish to call the attention of our farmers to this subject. We are depriving our soil of its fertility year after year, and the probability is, unless we change our practice, that within the next century it will become so barren that it will be hardly able to support the increased population which will follow from emigration to this country.

CORN.

ADDRESS OF M. L. DUNLAP.

Ladies and gentlemen: The few remarks that I propose to make on the subject of corn will be mainly devoted to its culture, leaving the analysis of soils, manures and the crop itself to other hands.

It is my purpose to deal with facts rather than theories; not so much what it is possible to accomplish as that which will make the best returns for our labor.

It is estimated that the wheat crop of 1868 amounted to 225,000,000 bushels, while that of corn figures up the enormous quantity of 900,000,000 bushels, or nearly four times greater. In 1866 the total crop in the United States of this grain was reported at 880,000,000 bushels, of which this State produced 155,844,350 bushels, nearly one-sixth of the entire crop of the whole country, being an average of 31.6 bushels to the acre, on 4,931,783 acres, and valued at $67,013,070.

We have no official figures for the crops of 1867 and 1868, but that of 1867 must have been considerably in excess of that of 1866. The entire value of this staple of the farm for 1866, including also wheat, rye, oats, barley, buckwheat, potatoes, tobacco and hay, in the State of Illinois, were estimated at $160,148,704; deduct the corn, $67,013,070, and we have for the other staples named, $93,135,634.

These figures show the great importance of this crop to the people of the State, and must place it at the head of our agricultural resource, not only for domestic use, but for export.

WHAT WE DO WITH THE CROP.

Chicago is called the most extensive grain market in the world, receiving a large share of the surplus of our crops from at least the north half of the State; yet for the year 1866 the shipment of corn from that point was only 25,288,526 bushels, a part of which came from Iowa and Wisconsin. We also ship East by various railroads, and South by the Mississippi river. On the whole, we must ship less than one-third of the crop, the remainder being used for domestic purposes, the manufacture of highwines, and the feeding of pork and beef. If we estimate that one-third of the crop is manufactured into highwines, beef and pork, this gives us a double profit, adding to the value of our pasturage and manufactures.

To this source we must attribute the greatest share of the prosperity of the State, in supplying the sinews of commerce, that have enabled us to stand the crash of commercial disasters, among which may be classed those of 1857, 1861 and 1862, memorable years to the business of the country, when the currency of the State melted away like dew before the sun; but, thanks to the potent power of the corn crop, the stream of business was again supplied, and the State moved forward with a steady progress.

THE AVERAGE YIELD.

The average yield for the State is put down at 31.6 bushels for the year 1866; Indiana, 36.5; Ohio, 38; Michigan, 32; Kansas, 34; Nebraska, 29; Maine, 33; Massachusetts, 34; New Jersey, 43.3. As we go South we run down the scale, South Carolina being 5.9; Georgia, 6.2; Alabama, 9, and Louisiana 17 bushels per acre.

If we take these statistics for our guide we must consider New Jersey the best, and South Carolina the very worst state for this crop. The general average being 25 bushels to the acre, this State is but a little above the average, notwithstanding its rich soil and genial climate; the fault being in our superficial culture. While we should stand first on the list, we are in fact the twelfth, five out of six of the New England states leading us in the yield per acre.

This condition of things is not very gratifying to our Western pride, but as it is a condition of things within our power to change, we should address ourselves to the task. When we boast of our millions of bushels of this staple we ought to keep out of sight the millions of acres that we run over to obtain the quantity. But I fear these ugly figures will continue to be paraded before us until we change the result by improved modes of culture.

THE POINTS INVOLVED.

At present we are under no particular necessity to produce the greatest yield that the soil is capable of, without regard to cost; for population makes no such demand upon us, nor will such a course prove the most profitable. We must therefore seek for the best returns for our labor and our capital. When land is cheap and labor dear, we may use more land and less labor to produce a given quantity of grain, and thus receive as large a percentage on the capital invested; but as land grows dear this plan of management must be changed to conform to the changed condition of things.

If the New England states produce more corn to the acre, it does not follow that they produce it at a less cost; on the other hand, we know that we can deliver corn at any point on the seaboard at a cheaper rate than they can, a fact that is daily demonstrated.

The profit of any crop is the sum that it commands in market over and above its cost. Now what most interests us is to widen this margin, and there is but one way in which we can do it. We cannot raise the price in the market, for that is a matter regulated by many other considerations besides the quantity of the particular crop on sale. As we cannot raise the price, and thus widen the margin between the cost of production and that at which it is sold, we must see if it is not possible to reduce the cost of producing the crop, either by lessening the cost per acre, or to increase the yield, without adding to the cost, by a better system of management and of culture.

In the first place, that part of the crop that we consume for the ordinary use of the farm, such as the feeding of teams, pork and beef for the family, is not affected by the market price; but the surplus, that which must find a

market, to be exchanged for other needs, is the subject of further consideration. Shall it be sold in bulk or fed to animals and sold in the form of beef and pork? And yet, in this case, if so fed, how shall it be done? In the ear, in the shock, or sent to the mill and ground, and then fed raw or cooked? These are all questions pertinent to the subject, and must have a place in considering the margin of profit. For this part of the subject we have not the time at command, and will leave it until we come to the subject of the feeding of cattle and hogs for beef and pork, and the manufacture of high-wines.

SOIL FOR CORN.

This grain may be considered the staple crop in all parts of the State, and is grown on every farm from Cairo to the Wisconsin line, and in nearly every case with a view to a surplus for market, either in its raw state or its products in beef, pork, mutton, butter or poultry. We may then say that all the various soils of the State are suited to its profitable production. This is true as a general thing and to a certain extent, but it would not be good advice to recommend corn as the leading crop on every farm and under all conditions of things; yet every farmer will find it profitable to a certain extent in a rotation of crops, in all parts of the State, and in every variety of soils; whether in the driftless region about Galena, the loess, the prairie drift, the modified drift, the arenacious flats or the river deposits, all are more or less valuable for this great staple of the West.

SCIENCE VS. ART.

Until within a few years the culture of the soil, and especially the culture of this crop, was an art only to be acquired by a long toilsome apprenticeship, and had this university been established before the days of Liebig it would have been simply a manual labor school, or a farm for the practical teaching of farm apprentices, but since the application of chemistry and vegetable physiology to rural industry, the culture of the soil is taught in the schools on the same general plan as that of any other science. This school having been established for the teaching of those branches of learning relating to agriculture and the mechanic arts, it is your business to teach the science relating to these departments, rather than the arts themselves. I could not be expected to take this audience into the field, or march them over the State, to point out the various soils, and to have them demonstrate their relative value by direct application, but we may teach them the science upon which rests their success, when they return to their several homes and apply these theories to the art of culture.

A NATURAL CORN SOIL.

Climate has much to do with this crop, while soil is also to be largely taken into the account. I have shown that the stony and comparatively sterile soils and frosty climate of New England produce an average cereal product above

that of our rich prairies and genial climate, thus proving that there are certain conditions, subject to our control, that have much to do with results.

A natural corn soil must be rich, well drained, and capable of withstanding drouth. Such a soil is the

LOESS OF OUR RIVER BLUFFS.

We always find "Illinois River" corn to command the highest price in the Chicago market. It matters not how indifferent the crop may be in other parts of the State this corn is always graded No. 1, or "extra," always produces a good crop, and is always reliable. When the general crop is poor the millers inquire for this corn, and if it is not on the market a man is started down the river, in the neighborhood of Lacon, Beardstown or Havana, for a supply.

The reason of this superiority is mainly in the mechanical condition of the soil. It may not be any richer in the elements of plant growth, but it is thoroughly comminuted and drained, and hence is in a condition, at all times, to be plowed or cultivated. The spring rains do not retard tne planting, nor do they prevent culture for the killing of weeds. In this respect it is like sandy soils in a high state of fertility, with greater power of resisting drought. This soil covers no large area, but is found in patches along the rivers, sometimes mixed with the drift, and sometimes underlying it from one to ten feet, its presence always affecting the soil with which it comes in contact.

For the culture of the vine and orchard products it is held in high esteem, while for corn, from the first settlement of the State, it has continued to maintain the superiority over all other soils. With such a soil, all we have to do is to plant early and keep down the weeds, and the crop will be assured.

The depth of plowing on this soil is a matter of little moment, for the roots easily penetrate to any desired depth, as the soil is always friable and readily penetrated by the rains, and never holds stagnant water. It can, therefore, never pack, even if plowed immediately after a heavy rain, as in the case of our rich loams and heavy clays.

We may take this soil as the standard for the corn crop, by which to measure the relative value of other soils, and by which to change them by artificial means so as to approximate their value.

To add sand and organic material to the clay soil to make it correspond to the loess, is practically out of the question; but we can underdrain this soil and add fertilizers, so as to put it in a condition that it may produce good average crops, perhaps equal in value, though at an added expense.

If we had sufficient area of loess on which to grow all the corn required, it would be the best possible arrangement, and beyond competition; but such not being the case, we must make the best of such soils as are at hand.

This leads us to the consideration of

TILE DRAINING.

We all know that the gasses that are washed out of the atmosphere by the falling rain have a stronger affinity for the soil than the water when the wa-

ter can pass through the soil. This absorption is effected naturally in the loess, but not so in the clays or clayey soils. The water cannot pass off through them without artificial assistance, and this is accomplished by the aid of tile, laid deeply in the subsoil and offering a free outlet to the water, the soil holding the gasses on account of its greater affinity to them. This is one of the principal reasons for the uniform fertility of loess formations, as they always retain the ammonia and other gasses of the rainwater. It will be seen that tile draining has a similar mechanical effect on the soil, hence the great value of tile draining. But this is not all the value to be obtained, for a soil thus treated, like the loess, is nearly always ready for the plow, and thus in the condition to be planted early in the season—a point of great importance, as I propose to show in its proper place.

The question of drainage involves another one—of capital—a condition that most farmers might not find it convenient to comply with; and this brings us to the inquiry in regard to using more capital and

LESS LAND,

or rather to turn part of the land into active working capital, with the intention of doubling the crop per acre. All our lands may not be so largely benefitted by tile draining, but a large share of our clay loams, or heavy clay soils, as well as some of the sandy clays of the carboniferous limestones. The sand ridge that crosses the Illinois Central Railroad at Onarga is an example of this latter variety of soil, containing a large or greater percentage of sand than the loess, yet it holds water like a sponge, and can only be made available by either tile or surface draining.

Wherever the water can pass through the soil, the air can and will follow, and, as it supplies a large share of the elements of plant growth, is of the utmost importance to the crop.

In the soil, the tendency of water is in two directions—the one downward, by natural or artificial drainage, for the purpose of depositing ammonia and other gasses, and the other upward, by capillary attraction, to supply moisture for the elements of fertility. To enable water to perform this double duty, the soil must be finely comminuted, and not liable to pack or become tenacious. The passage of water and air downward through the soil has the effect to put it in condition for the ready penetration of the roots through its strata, and for the easy access of water from below by capillary attraction.

The old theory of composts has been rendered obsolete by this new science of draining, as it has been proved that when the water can pass through the soil the fertilizing elements are retained, unless the soil is very sandy or has not sufficient clay to absorb these gasses, and this has led to the new mode of applying manure by top-dressing.

On many of our soils

SURFACE DRAINING

by back-furrowing into seed beds, has proved useful in a general way and exceedingly valuable to this crop, not so much on account of aiding the fertility of the soil as to allow of early planting and prompt culture after a

heavy rain. These seed beds may be two to four rods in width, and ought to be laid out in the direction of the natural drainage, and in case of crossing a depression a cross drain should be made to lead off the water. Repeated plowings will raise these beds to any desired height, and thus keep the surface free of water and allow of easy and prompt culture. In a wet season this is of the first importance, for corn will make little or no growth while water is standing on the surface, while the weeds are not affected by the same cause and rob the crop of those elements so essential to its growth. When we must destroy weeds between showers or rainy days, the surface must be in a condition to dry quickly, or the next shower will be in the way of their destruction, and the crop will suffer by their continued growth. There is no further extra cost in farming these seed beds than the slight trouble of laying them off of a uniform width. Should the land be tile drained, the dead furrows already made will facilitate the operation, and, by reversing the plowing, the surface can easily be made to assume its original level.

We shall next consider

THE TIME OF PLANTING.

In Central Illinois, say on the line of 40 degrees of latitude, planting ranges over a period of sixty days, as the extremes, or from April 20th to June 20th. Plowing for the crop often precedes this by ten or twenty days. In all tenacious clays it is not desirable to plow when the ground is very wet, as it packs the soil, and thus, for the season, locks up its fertility.

In this early plowing it often occurs that the heavy spring rains so pack the soil that the surface will need a stirring with a cultivator to render planting possible, and to destroy the first crop of weeds.

As a general rule, our farmers prefer to plant from the first to the middle of May, and only from necessity plant outside of this time. Last spring a small amount was planted in April, all of which had to be replanted on account of rainy weather and the want of tile or surface draining. These heavy rainfalls occurred over the entire State, and active planting did not take place until the 18th of May, and continued until June 20th. That part of the crop planted as late as May 25th matured in about 125 days. Some of it was injured by the frost of September 17th and 18th. All of the later planted was more or less injured by frost. We may set down 120 to 125 days as the average period necessary to mature a crop of Dent corn, from the time of planting to its immunity from frost.

A warm arenacious soil, a free use of manure, and clean culture, will, of course, modify these figures to some extent; nor must we lose sight of the condition of drainage in this connection, for in a cold wet season it warms the soil, and thus hastens growth.

PLOWING AND PLANTING.

If we could follow up our daily plowing with the planter we should have less cause to complain of the want of a good stand; but this is not always obtainable, sometimes for the want of a corn-planter and sometimes for the

object of check-row planting. When it is necessary to plow a certain field, or part of it, before it is planted, it must then be marked one way and planted at right angles to this marking, by depositing the seed at the point where the lines cross each other. In this mode of planting the field can be worked both ways with the team, which is very desirable.

Several efforts have been made to construct a planter that would plant a land, or one of the seed-beds before described, as plowed, and at the same time check-row, but thus far the success has only been partial. So desirable is it to plant immediately after plowing, that many farmers plant their rows in one direction, sometimes in drills, but mostly in hills with the common planter. In this way the young plants have the start of the weeds, and will be ready to work at the close of planting the field, if it is of a size to require some days to complete the work. In this way no time is lost, the working follows the last planting, and the weeds are easily kept in check.

No one thinks of planting by hand, and the entire crop of the State may be said to be planted with automatic planters drawn by horse power, and planting ten to fifteen acres a day. The "Illinois Corn Planter," made at Galesburg, like the Moline Plow and Fairbank's Scales, is the standard of excellence by which all corn planters, plows and scales, in their several departments, are measured.

THE DEPTH OF PLOWING.

This depends much on the condition of soil in regard to moisture, porosity, color, drainage and mechanical texture. A heavy clay, like our timber ridges and dry prairie swells, should be plowed deep, say eight to ten inches. Without deep plowing on this class of soils the crop will be uncertain, while on clay loams shallow plowing, followed with thorough culture, will be found quite another thing. On sandy soils the depth of plowing is of even less importance, and the same rule holds good on all tile and surface drained lands, for the reasons before stated.

ROLLING.

There is nothing that has more distinctly marked the progress of corn culture than the general introduction of the roller. It serves to pulverize the soil and to render it more finely comminuted, adapting it for a supply of moisture by capillary attraction. It has also great advantages in insuring a good stand. If we plant deep when the soil is cold or wet, the seed is lost; if shallow, without rolling, and the weather becomes dry, with high wind, the seed will be liable to fail of germinating; but if planted shallow in a finely pulverized soil, closely packed on the seed, the warmth of the sun, however slight, brings it forward, and the drying winds will have little influence in retarding its germination, and we thus insure a good stand under almost all conditions of the weather. In case the soil is a little wet, so that it packs, however slightly, it is of great importance to have it pulverized and made friable. After the winter's frost ceases, the only remedy left is to accomplish this by mechanical means, and the roller offers the best facilities for this purpose.

CULTURE.

My time will not permit of going into all the minutia of culture, and I will therefore proceed to give in detail a system that is simple and well adapted to cheap lands and dear labor, not one that will produce the greatest possible yield, but one that will make good returns for the capital and labor employed.

I will take it for granted that the soil is well drained, either naturally or by raised seed-beds, as previously described. The plowing and planting to go hand in hand; the roller to precede the planter; two or three days after planting to be harrowed and again rolled. The object of this operation is twofold—to comminute the soil and to pack the surface closely on the seed, so as to hold the moisture necessary to its germination. It is also desirable as enabling us to cultivate at an earlier stage of its growth.

We may then follow up the culture weekly, or as often as desirable, until the period of laying by the crop.

WILD UNBROKEN PRAIRIE

that has been pastured for some years, when broken up to the depth of six to eight inches at the proper time for planting, is found to be among the most valuable and certain of a crop, giving a better yield than the old lands. This suggests the propriety of a rotation of crops with the meadow and pasture.

We might give some figures of the cost of cultivating forty acres in the mode we suggested:

To plowing forty acres eight inches deep, one and a half acres per day, at three dollars per day	$80 00
Rolling, three days	9 00
Planting, three days, including use of the planter	12 00
Harrowing, four days	12 00
Rolling, three days	9 00
Working with two-horse cultivator, four times, twenty days	60 00
Husking and cribbing 2,400 bushels corn at seven cents	168 00
Five bushels seed	5 00
Total cost	$355 00
Cost per acre	8 87
Cost per bushel	$10\frac{5}{8}$

If we allow one-third for the rent of the land, as is the custom, we have the corn delivered in the crib at 22 18-100 cents per bushel to the tenant, while the owner of the land has twenty bushels to the acre for the use of his land, which, at fifty cents a bushel, gives him ten dollars an acre as rent. I do not suppose that any person conversant with corn culture in this State, will consider this estimate above the average yield under such a system of culture.

MANURES AND HOEING.

As a general thing manures are not applied to the corn crop in this State, but in every trial it has been found profitable.

No one thinks of going into our large fields with a hoe, but the price of land may advance so as to make this an object, with a view to increase the yield per acre.

I have but lightly sketched a few of the more prominent features regarding this great staple that has given to the State a large share of her material prosperity, that has placed her in the front rank of the states of the Union, and the central commercial power in the Northwest, and that will continue her in her onward progress.

DISCUSSION.

Mr. Freeman—One year ago last fall I had occasion to stop and feed my horse, and I noticed that the man had red corn in his crib. On inquiry, I found that he raised red corn exclusively. He had grown this variety for many years. His reason for it was, this corn yielded more per acre—100 to 110 bushels, by weight. It was admitted that he was ahead in corn growing of his neighbors, and that he was ahead 30 years ago. My father raised 100 bushels to the acre, but he did it by putting on bone dust.

But what I wish to speak of more particularly is of the varieties of corn in selecting for seed. I saw in some paper the statement of the fact that a chemical analysis of the common white corn and the Tuscarora showed that the white corn had double the amount of phosphates that was contained in the other. Now this being the case, it is important to observe the fact (if it is a fact) in making our selection, and to take that which will exhaust the soil least, providing we get equal weight in corn. I have an impression that an analysis of corn of different colors might indicate that we should get this man's red corn. The color of corn, if it is sound, does not seem to affect the price of it very much. Last year, having occasion to buy seed corn, I went to my neighbors to get it, and found that they had colored corn. I got some of it and planted it, and it was very curious to note that the horses and mules would take to it more readily than to the white corn. (Here various samples of corn were shown by the speaker.) The corn generally grown in this region is, I believe, of the Dent variety.

The gentleman says one way to increase the crop is by improved culture; I think another way is by studying the varieties and learning what variety will produce the greatest weight with a given amount of labor.

Dr. Morse—My friend Mr. Dunlap took me to task for some statements that I made, for which I am very much obliged to him. I wish now to pay him off in his own corn. [Laughter.] He says that the corn in Southern Illinois is wanting in nutrition, as compared with corn grown further north, because it lacks a full proportion of starch. Now I say all corn grown south has more starch than corn grown in the north, and for that reason is lacking in nutritive qualities. Because starch makes a man's collar stiff it does not follow that it stiffens his back bone. [Laughter.] In regard to the nutritive value of different varieties of corn, we think the New Jersey corn the best. This corn should not be fed whole but ground.

Mr. Dunlap—I am very happy to give the Doctor an opportunity to return the compliment, and I only regret that he did not take advantage of it. It is a fact that when we come to look upon the corn of Central Illinois we find a corn that will make perfect whisky, and is food for everybody—the like is not grown in the south. Doctor, anything more?

Dr. Morse—I believe you have not told us whether it is profitable to grow corn for fuel.

Mr. Dunlap—That shows the ignorance of the people of the East, who still think that we out here breakfast on young Indians cooked! Why, we have seven feet of coal; we don't need to grow corn for fuel; we have something better.

One other point. No food is more nutritious than corn, for the reason it contains the phosphates in large proportion. It is solid food, and can be used three times each day. I regret that it has not been introduced universally as an article of food for man.

Mr. Robinson—Ordinarily the white corn is worth ten cents per bushel more than yellow corn. Still-houses make no difference in the price. The glutin is equal in the two varieties, but the oil and the starch is different. I think that stock do better on yellow corn.

That idea of burning corn is not so ridiculous after all. I have seen corn used for fuel. When corn is only eight and ten cents per bushel it does not pay to take it to market, and would not pay

for digging up the coal. And about eating young "Injuns." We do eat Indians, but it is in the form of Indian corn. [Laughter.]

Prof. STEWART—It seems to me that gentlemen labor under a slight mistake in reference to the origin of whisky. It comes from the starch of corn. The starch is converted into sugar, and the sugar into alcohol. That corn which contains the most starch is the best for the distiller. Hence white corn, having more starch, is the most valuable for his purpose.

Mr. ROBINSON—Distillers make no difference in the price they pay. The starch manufacturers will give eight cents more for the white than for the yellow.

Mr. DUNLAP—This is because of its whiteness.

Mr. ROBINSON—They make no difference in the price. There is Missouri corn, with ears eight feet from the ground, but the Illinois River corn brings the highest price in the Chicago market. I think there is no reason for it, except that it goes by canal, and gets into market in better order.

Prof. STEWART—What varieties of sweet corn, for table use, do you recommend?

Mr. DUNLAP—There is one variety called early sweet corn. This is the best for the first planting. Then comes three or four other varieties; among them, Stowel's Evergreen, which has long ears, and is, perhaps, the best.

Prof. STEWART—I have not had success, as a general thing, in raising sweet corn and having it early. I have raised King Phillip corn and had it for use by the first of July. It may be bitten off by the frost to the top of the ground a dozen times, and it will still come, and we will have it by the first of July. We plant it in March, say about the 20th or 25th, planting about half an inch deep. I remember on one occasion planting corn in my garden—only five rows. This brought me $16. A few days later corn was not worth anything, comparatively. I have been in the habit of raising it for my pigs. I sent East for ten bushels of it, planted in July, which hardened up before frost.

Mr. DUNLAP—The Tuscarora corn is grown in the place of sweet corn.

Mr. PERIAM—My practice has been to plant very early. I should prefer to plant King Phillip corn in March rather than the first week in April; for we know that corn will sometimes grow planted in the fall, when planted in April it will not grow. The

Burlington corn ripens in 85 days. It is the earliest corn I know anything about. I would advise the planting only of the extra early kinds, and plant these *very early* in the season, about the time of sowing oats.

Dr. Morse—I recently traveled East, and found the people growing corn for the purpose of canning. Now it seemed to me that this was a good thing for western farmers to go into. I said to one man, "I should think western men would go into this," but he replied, "they can't do it."

I remember, also, visiting a cheese manufactory. "Well," said the gentleman showing me around, "one thing you can't do out West, you can't compete with us in making cheese." I replied, "we can beat you all to pieces." "You have no springs," he retorted. "There is a man," I said, "who has invented a milk-cooler, and we don't need your springs." Eastern men try to convince us that we can't do what they can.

Prof. Stewart—I never saw any corn that was canned fit to eat.

Mr. Freeman—It is a very simple operation. I will give an illustration. I put up a dozen cans one season. I was assisting my wife in putting up the corn. We were going out that day, and were in a hurry to complete the work, and did not give the corn time to boil. It was soldered up cold and set away. A small hole was punctured in each can, and they were boiled the next morning, and every can of them kept perfectly, and all who ate of the corn said it was fresh and good as when cut from the cob.

A voice—Is there any danger of the steam bursting the can?

Mr. Freeman—No, sir; not at all.

A voice—How long do you boil it?

Dr. Hull—Four hours is the time.

Mr. Freeman—From observations made in the southern part of the State, we gather the following interesting facts: In the elevated regions about Cobden we must plant early, but 30 miles south of there, on a fine bed of loess, they plant corn on the first of July and make fine crops. They are there about sixty feet above water-marks. Cobden is 500 or 600 feet above.

Mr. Dunlap suggested that it would perhaps be easier and safer to grow corn and *dry* it, instead of canning, a process not always successful in all hands.

DR. WARDER ON THE PLANT.

What is a plant? The question appears to be a very simple one, and one which almost every one feels himself capable of answering. And yet learned men are puzzled to answer it.

A plant is certainly different from an animal. It is different from a stone. We might perhaps be tempted to rank it between an animal and a stone. But we observe that it has an organized being. Linneus gives this definition: Animals live, grow and feed; plants live and grow, but do not feed. But stones neither live, grow nor feed. Stones, we say, do not grow. They increase in size by accession, or accretion. By additions of rocks on rocks, they increase in size.

Now this definition, considered satisfactory, is not so satisfactory, after all, when we come to examine the lower orders of animal life, and the highest orders of plant life. We have animals that do not move, the oyster for example. We have plants that, while we cannot say they see or feel, yet they seem to be exceedingly sensitive. We have a plant called the "sensitive plant," which is an example and good ilustration of what I say. If you approach it it seems to be aware of your presence, and its words are "touch me not."

In the study of the general attributes of plants, we are scarcely able to separate them from animals by any absolute character. Animals are, for the most part, incapable of multiplying by mechanical or spontaneous subdivision of their trunks, and are supported by nutritious matter carried into their system by an internal bag or stomach. Plants are, for the most part, a congeries of individuals, multiplying by an artificial division of their trunks or axes, and supported by nutritious matter conveyed into their systems by the absorption of their outer surface, chiefly by their roots. Generally speaking, plants are fixed to some substance, from which they grow, are destitute of locomotion, are able to digest their food by the action of light upon their skin, and form starch at some period of their lives.

Animals, on the contrary, seem never to form starch. In the simplest animals and in the simplest plants are vesicles, or vesicular threads, the most complex of which may be regarded as indefinite multiples of such vesicles, arranged in definite forms. These are composed of tissues, out of which elementary organs are constructed. Tissue, when first formed, consists of a substance called cellulose: carbon 24, hydrogen 20, and oxygen 10. That is in its simple form, but its chemical nature is rapidly altered by other matters, and especially by an increase of the relative proportion of carbon.

There is another remarkable property of tissue. It is a hygrometrical substance, possessing adhesiveness, elasticity, extensibility, irritability and vitality.

Its adhesiveness enables the elementary organs to grow and adhere to one another when in contact. Its elasticity permits the tissue to bend and recover its position—to stretch and contract itself. The former property is essential to plants, in consequence of their exposure to the disturbances of

the atmosphere, from which their want of locomotion prevents their escape. The latter is demanded by the emptying and filling processes, which are incessantly in action in the elementary organs while growing. Its extensibility enables it to enlarge as new matter is added to it, and to take in the fluids and gases received from without. Its irritability renders it susceptible of the influences of light, heat and other external forces. Its hygrometrical quality causes it to absorb water greedily when presented to it, a quality or condition that is essential to vegetable life. The next property I will name is that of vitality. This keeps all the other qualities in play, enables plants to digest and assimilate their food, and their various organs to perform their manifold functions.

Now there is another property to be named. The various forms are held together by an organic substance called *mucus*, out of which the tissue is generated. This is called intercellular substance, or *cambrum*, when exuded on the parts of an already organized plant.

Tissue appears in various forms. In the form of cellular tissue—the woody fibers, the vascular form; the pitted and the laticiferous forms, variously modified—constituting the elementary organs. We now come to consider these elementary organs, and first, cellular tissue. We have endeavored to give a representation upon the blackboard of cellular tissue. This is the only elementary organ found in plants. It is composed of vesicles. Each vesicle is a distinct individual, cohering to its neighbor. When separated they are round or oblong. When compressed slightly they assume another shape—hexagonal. When stretched they are prismatic, cylindrical, fusiform. We have here on the board what was intended to represent cylindrical cells. The whole may be considered as a cylinder. There is a representation also on the blackboard of what we call pitted tissue.

Woody tissue is made up of long cells, tapering to the ends, closely compacting the plant together. The growth of cells consists in the deposit of matter in these thin tissue formations. That they are cells is seen when immensely magnified by the microscope. We see it in cotton. In cotton the cell is elongated. [Here the lecturer illustrated the formation of cells in cotton on the blackboard.]

If any of you have ever been stung with a nettle you have experienced the power of a single cell of that plant. [Explained upon the blackboard.] It is the poison of one cell only that escapes and enter syour body. [Vascular tissues and spiral vessels were explained on the blackboard.]

The anatomy of plants was studied long before the true physiology of plants was understood. In the earlier investigation of this subject it was supposed that these cells were air vessels. These vessels do perform important functions. They offer a subject for investigation full of interest, but it is almost impossible to illustrate and explain this subject without recourse to the microscope.

I have spoken of the growth of cells by the deposits laid upon them. This was further illustrated on the blackboard. To the question, "how do plants get anything to eat and drink, and thereby develop growth?" it was answered, they can grow only by absorption from that which is without.

On the subject of the development of cells and the growth of plants, the following was given as the contents of proloplasm—the vital vegetable substance:

Amyloid-jelly, starch, chlorophyl, chromule, wax, oil, camphor, resin chrystals or raphides, sugar, gum, dextrine, tannin, caoutchouc and alkaloids.

We cannot dwell much longer upon this part of the subject.

One of the first things or parts of plants that will attract our attention is the outside—the outer skin, called epidermis. At points in the epidermis there are openings which open and shut at the will of the plant—some plants at least seem to have life. These serve as *stomates*, or little mouths of plants, through which they take their food by absorption. The epidermis, stomates and hairs were given as simple organs.

I wish now to say a few words about compound organs—the axis and its appendages, formed from a spore, an embryo, a leaf bud, by the development of a root in one direction and a stem in the opposite direction. This root downward and stem upward is the first thing that strikes us in the development of a plant. I have here on paper a picture of an ideal plant, showing the seed, the axis ascending and descending. We will explain these terms, spore, embryo and leaf bud. A spore is a young plant, produced in the interior of another without the agency of the sexes, and having no determinate points of growth.

An embryo is a young plant, produced by the agency of the sexes, developed with a seed, and having determinate points of growth. Take a Lima bean and soak it, and you can see the embryo.

A leaf bud is a young plant, produced without the agency of the sexes, inclosed within rudimentary leaves called scales, and developed on the outside of a stem.

A spore, or an embryo (seed) propagates the species; a leaf bud propagates the individual.

When excited the tissue develops in three directions: downward, the descending axis or root; upward, the ascending axis or stem; horizontally, the medullary system. Every part which grows from this axis in a symmetrical manner is an appendage; the leaf is the type of all. The stem is always produced by the successive development of leaf buds. In proof of this we state the fact that if you carefully extract the bud from the axil of every leaf the stem will not increase in size. If you make a notch below the leaf bud it will not increase in size. You may tie a string tightly around the stem and parts below will not increase, but parts above will increase in size remarkably. We saw this beautifully illustrated at Bunker Hill, in the orchard, I believe, of our friend Mr. Jon. Higgins. The sap could flow from the roots and stem upward through the wood, but could not return through the inner bark below the bandage.

The diameter of exogenous trees, that is trees that increase by accretions on the outside, increase in proportion to the number of leaf buds. But there is another class of trees called endogens—those which increase from within—inside growers. [Explained by reference to diagram on the board.]

A word in regard to the leaves, which are the appendages of plants. Before the leaves appear the seed lobes perform the functions of the leaves. By-and-by the leaves appear, becoming more complex as they ascend the stem, with various arrangements and modifications. Finally appears the flower, embracing the seed buds and becoming the seed leaves! a plant, perfect in all its parts.

Now you see that buds are little plants, seeds are little plants, embryos are little plants.

We have these two methods of propagating: If we propagate by seed we propagate species. If we propagate by buds we get individuals. Occasionally a bud will "spurt," but, as a rule, you may plant a bud with perfect certainty that you will have a result like the tree from which the bud was taken.

DR. WARDER'S LECTURE ON THE NECESSITIES OF PLANT LIFE.

In attempting to portray the world of teeming nature, as it has been spread before us by the Creator, the poet philosopher, the celebrated Goethe, makes Faust say "A thousand germs come struggling forth in drought and damp, in heat and cold." And yet, under these most opposite conditions, each germ appears to be perfectly satisfied with its surroundings, different as they are. The fact is that various plants require just these opposite conditions for their development.

The protococcus, which delights in the snow and ice of the northern polar circle, could no more exist in a heated atmosphere than could tropical plants if removed to our latitude. Wisely and well it has been arranged by Him who doeth all things well, that each portion of our globe where plant life is at all possible shall have its own peculiar flora and fauna, so that wherever life is practical, some beings shall be found to enjoy it. Hence, also, the charming diversity of organized beings; and by the aid of Geology, with its adamantine records, we find that such has been the case ever in all ages of the world's history, only that the conditions of many portions of the globe must have been entirely different, as to heat and moisture, at certain epochs, such as those at the coal formation from those with which we are familiar in our own times. Even in the latter portions of the quaternary period, perhaps just before the historic era, when man was introduced upon the earth, these broad and undulating prairies that surround us were vast pools of shallow water, filled with confervæ, that could subsist only under such conditions of moisture and temperature as then existed. Though no human eye was here to watch their progress, to study their mode of growth, to examine with the microscope the curious changes going on among their cells, the all-seeing eye of Omnipotence was superintending and directing the process of growth, development and decay that was preparing for us the fine rich prairie mould from which we are now deriving our sustenance, and from the productiveness of which you are enabled to feed the world.

To sustain them plants must have food. But what constitutes that food? You were told by *Prof. Stewart*, in his excellent lecture, of all the different

chemical elements that are found in vegetables; these, therefore, must have existed in the food of the several plants, but you will recollect he informed us that of these elements four only constituted the chief bulk of plants—carbon, hydrogen, oxygen and nitrogen. These, then, are the chief or most important parts of plant food, though some of the others are equally essential to the healthy growth of a plant, even though they be taken in smaller proportions.

Do the plants need these elements in a free or in a combined state? This we do not know, but the inference is that they are taken only in a state of combination, except oxygen, which is diluted in the atmosphere, held in suspension and mingled with nitrogen rather than chemically combined with it. Water and air are the great means of presenting and bringing food to the plants, and it is probable that water is essential to the digestion of the food, to the production of the fluids and to their passage through the organisms. So what we call crude sap is really a weak solution of substances that are taken into the circulation, carried up along the so-called air vessels of the alburnum, and diffused through the organism, variously modified by and producing various modifications upon the materials it meets in its progress of cell circulation. The compounds thus taken into the tissues of the plant are resolved into their elements, or rather they are transformed into other compounds by the curious and hidden processes of the vegetable laboratory. We must not forget, however, that the functions of the leaves are not simply to act as exhalents, throwing off the surplus watery fluids by evaporation, but they are also absorbents, drawing in from the atmosphere carbonic acid, from which, under the influence of sunlight, they retain the base and throw off the oxygen.

But to return to our topic. Let us consider the necessities of the embryo, the seed which we intrust to the tender mercies of the earth. It has within its own organization the elements of its future growth, but in very limited amounts. It can create nothing, and if the resulting organism increases in weight, as we know it does, and with great rapidity, let us inquire what are the conditions that will favor this development, and what the materials to be added.

As a rule we desire to exclude the light, hence we cover the seed with the soil, and here, practically, we must observe that this covering should not be too great, and that the smaller the seed the less the covering should be. Next our seed needs moisture, and the soil will furnish this in the right proportions, to be absorbed through its teguments, that willingly receive it, sooner or more slowly, according to its physical condition. Sometimes this is very slowly indeed, with seeds that are invested with a horny or woody covering. The air must have access to the seed, and this is always present in sufficient quantities in well prepared and properly comminuted soil, though excluded by an excess of water, as sometimes occurs after heavy rains. This air is needed for the sake of its oxygen, which is the great vivifying principle or element.

Carbonic acid is also at hand, held safely in store by the humus of the soil, but ready to be transferred to the radicles so soon as they are formed, if in-

deed it be not taken into the germinating seed itself. Ammonia, or its carbonate, is also held in the same manner by the soil, which is the great disinfectant of the atmosphere, as well as the filterer of the rains which wash the ammonia from the air in every shower. Nitric acid, and perhaps sulphuric acid, is also washed from the air by the same means and left in the soil.

Here then we have a rich banquet spread out for the young embryo that is to be developed from the seed into the coming plant. Its necessities are all supplied—light, heat, moisture, air and appropriate food. Thus we have considered the necessities of the plant, which is to be produced from a seed, but it has been shown that the bud plant is only another form of the development of the seed and its embryo, or rather, we should say, that the seed embryo is only another form of the leaf bud, modified by the morphological action of the plant—apparently changed—certainly different in its characters, and capable of undergoing a longer separation from its parent stock, capable of being transported to a greater distance, and also capable of producing a new variety, somewhat different from its parent.

We should therefore consider the necessities of the plant in this form, also—the bud. For we may as well consider each of these organizations, henceforward, as a distinct plant, rather than as a part only of a plant. So long as it retains its connection with its parental organization it needs only such treatment as is bestowed upon its parent. There it may remain for a long time dormant, even until the destruction of the entire plant, the complex organization with which it is connected, or, as is usually the case, it may develop into an axis of growth with its necessary appendages, and produce more buds, or even modified buds—seeds.

But when separated its necessities will be somewhat different. It has already been demonstrated—and you may verify this at your leisure by making longitudinal section of any large terminal bud, as that of a lilac—it has already been demonstrated that a bud has an axis of growth, just like the stem of a plant, though shorter, but it also has leaves, the scales, as they are called, which invest it closely and serve as a protection from the elements. And these are evaporating surfaces, that would soon exhaust the plant of its moisture, therefore the bud cannot be safely exposed, like the seed, but requires sooner to be placed in conditions more favorable to its preservation. These are, that when separated, as in any of the methods practiced in propagation, it should be placed in a confined atmosphere in contact with the soil, if possible, with a sufficient but not excessive amount of moisture, and with the proper degree of heat and a diminished amount of light.

It must not be overlooked, however, that these bud plants may be safely transferred from one plant to another, under favorable circumstances, and that they may be made to grow in their new situation, not directly in contact with the soil, and only connected mediately with it, as in budding and grafting. It is better, however, to consider first the necessities of our bud plant when placed in immediate contact with the soil itself. Bear in mind that our bud has already the organs necessary to constitute a plant, to-wit: the stem and the leaves. The former may be very short, the latter very rudimentary. In this case we need *almost the* same conditions as with the seed, only that

as we desire to extend the axis or stem downward to form the roots, we need to encourage the development of cell growth, for the formation of a callus and roots, before we excite the development of the ascending axis or stem, with its leaves and appendages, because we must seek to supply additional moisture to keep up the waste by evaporation that would occur if the leaves were developed first. To effect this we encourage the cell growth of the base of the bud or short cutting, until, by the accumulation of new cells, a callus is formed, from which, by a further development of cells, arranged in a continuous line, rootlets are formed to absorb nourishment from without, just as occurred in the seed by direct absorption of water through its tissues, before the development of the embryo into the plantlet, with its radicles and plumule.

The bud cutting is then ready to have its upward growth developed, and this should now be encouraged. All this is perfectly under our control, and it depends upon the amount of heat and the mode of applying it. This stimulant should be withheld from the upper portion and increased at the lower. In the language of the gardener, we should apply "bottom heat," keeping the soil a few degrees warmer than the air, until the rootlets are formed, and then applying it to the surface to stimulate the development of the bud and encourage its upward growth.

DISCUSSION.

Mr. DUNLAP—With your permission, Mr. President, I would like to ask the Doctor one question. In relation to the growth of plants or trees, we observe that all do not grow in the same manner. What terms do you use in describing these different forms of growth?

Dr. WARDER—I will answer, there are outside growers and inside growers. The one is called *exogens* and the other *endogens*. We have on the board a representation of outside growers. The rings indicate the amount of increase in the several seasons.

Mr. DUNLAP—Now I can make up my notes.

Dr. WARDER—I hope your notes will be complete. [Laughter.] One word in regard to taking notes. I do not think it is advisable for the students to take extensive notes upon this subject. Do not attempt to take down notes verbatim. Seize upon the point presented, and endeavor to retain it. Jot down a word here and there, to aid the memory, and fill out your notes, if you wish, in your room. But endeavor to get the idea.

Dr. GREGORY—I am glad that Dr. Warder has mentioned this subject. It is a matter of importance that you give your undivided attention to the subjects presented in the lecture. It is es-

sential that you hear. Get the thing that is said, and get *everything* that is said. Never attempt to write out the whole sentence. I would suggest also, with Dr. Warder's permission, that the young gentlemen take occasion to read up on the subjects presented from time to time in these lectures. You will find that it will help you to understand and profit by these lectures, as you would not otherwise be able to do.

Dr. WARDER, in answer to a question about the failure of cuttings to grow, said: You will probably find, on pulling up the cutting, that it had not even formed a callus. The plant did not have force enough to develop itself and produce roots, and for the reason it was not placed in a condition favorable to such development. If the cutting had been placed in a position favorable to the growth of roots, then when the upper bud starts into growth the leaves would bring up the juices from the soil, through the roots, and secure the life of the plant. Plants die simply because they have used up the nourishment provided for them. There is only a definite amount of food in the cutting, and when this is exhausted, without further supply, there is nothing to do but to die.

Dr. GREGORY—You stated, Doctor, that your opinion was that heat was simply a stimulant. What is meant by heat stimulating plants? What is this stimulant?

Dr. WARDER—We know that when plants are allowed to grow in a dark place—the potato growing in the cellar is a good example—they are deficient in the qualities that belong to a healthy plant. But let a ray of sunshine and heat strike it, and how soon a change is made. There is stimulus—what we call stimulus. This develops increased action, and the result is the elimination of oxygen, thrown off in the air by the leaves. You have seen the long, slender, watery stalks of the potato growing in a dark cellar. They have no color, because it requires the action of light to produce the coloring matter. Plants fully exposed to sun and air have the chlorophyl, those not exposed have it not. The stimulus of light in the growth of plants is essential to their healthy development.

Mr. FREEMAN—Can electricity be regarded in any other aspect than that of heat?

Dr. WARDER—Perhaps not.

Dr. HULL stated that he had a different way of putting this matter. He explained that plants derive much of their sustenance

from the ground, and that they die because, being placed in unfavorable conditions in this respect, the supply of food is cut off. He started the question as to whether manure was not food for plants.

Mr. Dunlap—I am glad, Mr. President, that this matter of manures is to be settled here. I understand the Doctor to take the position that manures are food of plants.

Dr. Warder—I consider all manures food for plants, but I prefer my own language.

Mr. Dunlap—It is a question whether manures are food for plants directly, or indirectly by rendering the conditions favorable for the plants to obtain food from other sources, and I want to have the question settled now.

Dr. Warder—I do not think we can settle it. That manure acts as food for plants, either directly or indirectly, is my conviction, and what I wish to say is, that which in its crude state is a nuisance, may be composted into most valuable food for plants. He spoke of clay as being a good absorbent, and of earth-closets as being the most efficient and economical way of saving and deodorizing human excrement.

Mr. Dunlap—It strikes me that this is a subject that has been overlooked in this course of lectures, and I am glad that our attention has been called to it. There can be no doubt that portions of manure are plant food, but its great service is as *holders* of valuable gases known to be food for plants.

WHEAT.

A LECTURE BY W. C. FLAGG, OF ALTON.

The semi-tropical summer of the Mississippi Valley points to corn as the most natural and valuable grain that can be grown within our borders. But wheat, from its easy culture, its ready sale, and its universal and acceptable use, even upon soils and under skies not at all propitious to its growth, is second only in importance. We even find wheat grown where corn is the more profitable crop; something which I can only account for on the supposition that the quick returns of the wheat crop are an irresistible temptation to the thriftless farmer.

In Southern Illinois I find, upon fair calculation, that the cost and value of an acre of good corn and wheat are about as follows:

	Corn.	Wheat.
....	$1 50	$2 00
ng..	20	20
ff..	20	....
....	25	20
....	25	2 50
....	80	....
ng..	2 50	....
....	....	1 00
....	....	1 25
;....	....	1 10
....	2 40	....
g..	....	2 40
....	1 80	60
il..	$9 90	$11 25
estimated..	60 bushels.	20 bushels.
....	75	2 00
lue per acre..	45 00	40 00
e per acre..	35 10	28 75

makes an excess of $6 35 per acre in favor of corn, supposing it is and sold in the market. Fed on the farm, it could of course be made ore profitable. In that case profits from feeding could be added, and ure of the stock to which it was fed would go to enrich the land and the exhaustion of the soil.

e of such facts as the above, I believe that, in certain counties of our heat growing has steadily increased, while corn barely holds its own. y, St. Clair, Monroe, Randolph and Clinton counties, lying near St. he acreage of wheat, according to the Auditor's report just rendered, that of corn. In Monroe county three acres of wheat are grown to corn. St. Clair has nearly two acres of wheat to one of corn, and bout three to two. Other counties are following in their wake, and one and McHenry, on the north line of the State, give more spring han corn. No cattle worth mentioning are kept on these wheat farms. w is burned in the field, and the only return, if we may call it such, the soil, is generally a clover crop turned under, and, in a few in- a scanty manuring from the stables of the horses kept to plow the In some cases no corn is grown on the farm, but is purchased with the s of the wheat crops.

vheat grower therefore must look about him and seek better methods, ill rightfully be accused of bad economy. He may hardly be able to at, even with the best management, he can make wheat replace corn ; in the State of Illinois; but as part of a rotation, as one of a succes- crops to fill the year with labor and harvests, he may be able to show as a fitting place and a profitable use, whilst its excellence as a bread nders it almost indispensable.

ising thus much by way of protest against the terrible waste of agri- wealth now going on all over the West, by growing and exporting

this valuable grain, and robbing posterity without real benefit to even our own generation, I will undertake to say, in the want of a fit person, a few words on wheat growing.

In Illinois, according to the State Auditor's last report, we had, in 1867, 2,083,189 acres in wheat, against 4,725,386 acres in corn. Of this two millions of acres, probably somewhere about half was winter wheat, mostly grown in the southern part of the State, and the other part spring wheat, generally grown in the northern portion. The spring wheat seems best suited to the cooler springs of the northern portion, although I have known instances of thirty bushels to the acre as far south as Alton. The winter wheat, owing to the snowless winters on our plains and the looser character of the black soils, is more easily winter-killed in the central and northern part of the State, and is limited to the white soils of Southern Illinois for its most fitting place and successful growth.

The best soil for winter wheat, so far as I have observed, are the white oak ridges along the Mississippi bluff. The crop is there quite certain, and the quality of the grain and the flour made of it quite superior. The poorest soils for wheat are the wet and rich prairie lands of the creek and river bottoms. I suppose the wheat of Jersey, Madison, St. Clair, Monroe and Randolph counties, is about the best in the State, and is, no doubt, one reason of the crop having been so excessively grown in that part of the State. The hot climate of the southern part of the State, while I think it reduces the average yield per acre, probably has an effect similar to that of Southern Europe in producing a harder wheat, containing more gluten and producing a finer quality of flour.

The best rotation of crops in which wheat makes a part of the course, is, I think, the following, commencing with corn on sward:

First year year, corn.
Second year, corn.
Third year, oats, barley, or other spring crops.
Fourth year, wheat.
Fifth to seventh year, grass, as meadow.
Eighth to tenth year, grass, as pasture.

Thus for every year we have for every acre of wheat two of corn, one of oats, or other spring crop, three of meadow, and three of pasture. I am not prepared to say that this is the best possible rotation, but I think it is a good one, especially in its proportions of grass and grain.

Wheat, therefore, succeeds oats or other spring crop. It is a good succession to clover plowed under, and propably also to ordinary sward when pretty well rotted; but as a matter of convenience I prefer the above rotation, and let the stronger and ranker condition of green or other manures spend its first force on corn, while the wheat draws more from the better decomposed material and the original elements of the soil.

The stubble of oats should be turned under as soon as possible after cutting, in our climate, to a greater or less depth, which should vary according to the fertility of the soil and the weight of stubble. The poorer the soil, the deeper it should be broken up. The practice varies between breaking up

once in this manner and running a cultivator or harrow over the surface occasionally, to keep down weeds until sowing time, and plowing a second time just before seeding. All agree, however, in saying that the ground should be finely pulverized first, and then well packed together by rolling, or some other treatment, so that when the drill is brought into requisition it may find a hard, firm, fine soil to receive its flukes.

I say the drill, because all our experience in Southern Illinois, so far as I know, is strongly in favor of drilling in preference to sowing wheat. The drill saves seed, deposits it at pretty uniform depth, and leaves the plant sheltered in a shallow furrow by the adjacent ridges, whence the disintegration of winter's frost and thaws covers the roots instead of laying them bare. In the Michigan woods, where snow lies throughout the winter, I find drills in less universal favor.

Why wheat succeeds best when drilled in a hard soil, is, I take it, from the fact that such a soil heaves less readily, and does not admit frost to the roots so easily. This probably is one reason also of the superior success of winter wheat in the silty soils of Southern Illinois. The soil is there finely comminuted and comparatively free from vegetable matter, whilst here it is coarser, more friable and loose.

Owing to the ravages of the fly, farmers with us are now practicing later sowing than formerly. In avoiding this evil, however, it is a question whether we do not fall upon a greater. This late sowing necessitates the sowing of early ripening varieties, which are not the most productive, endangers the plant in winter from insufficient rooting, and delays ripening in summer, with consequent danger from heat and rust. The past season extreme heat, by its direct action, very materially lessened the yield per acre in our part of the State. But the rust is the disease most dreaded by our cultivators. This may be regarded as the result of extremes of heat and cold, drouth and moisture, whereby the vitality of the plant is lowered, and its tissues ruptured and made the prey of fungoid growths.

The culture of wheat has been rarely attempted in this country, although Jethro Tull and his Horse Hoe Husbandry were introduced by William Cobbett to American farmers over half a century ago. One gentleman who is present with us to-day, and who will, I hope, give his experience in the discussion, has told me that he fears spring cultivation because it increases the plant growth and delays too much the period of ripening, and endangers rust. Others, however, claim that harrowing in spring has been attended with a great increase of crop; and the drill itself suggests a use of that or a similar instrument to cultivate the ground between the rows of wheat.

This danger of late ripening, resulting from late sowing and spring cultivation, suggests renewed attention to the subject of early sowing. It ought, if possible, to be effected; and I trust Dr. Walsh and his co-laborers may sometime help us to it. Failing in that, we need to know more of those fungoid growths attending rust, potato rot, and the many diseases so fatal to the farmer and fruit grower. Here we feel the necessity of a State Botanist and Botanical Survey, which shall, among other things, develop and make

understood the various rots, rusts and mildews resulting from the changes of our variable climate.

The time of cutting wheat is a point upon which I have little personal knowledge, but which is a matter of great importance. It is a very common opinion that early cutting produces a plumper grain, a larger product, and a better flour. This opinion, however, is probably not correct, or at least only in part. During the past very hot and dry harvest, early cutting was, in one case that came under my observation, attended by absolute injury.

The methods of cutting, within the memory of many who hear me, have wonderfully changed and improved. First came the sickle. Not much before 1830 the grain cradle came into use in our State; ten or fifteen years later came the reapers and harvesters, the clash of whose shuttle-moving sickle bars are now heard upon all our broad prairies. These, like the "mighty night" of Euripides, brought comparative "repose to over-burdened men," but gave a new and probably excessive impulse to the growing of small grains.

Of reapers I have used only Hussy's, a heavy implement, only endurable when we had no better, and John H. Manny's, which I liked well. But I learn from others that Marsh's harvester and reaper, which carries two men upon it, who do the binding, is in many places doing excellently well. There are, however, a large class of reapers, all doing good work, and varying only in unimportant details, among which there is little choice.

Harvesters or Headers—so far as I have observed, I have no experience—are generally objectionable. First, because of the risk of waiting until the grain is dead ripe, resulting often in great loss from storms, and the "shattering" of the grain, and, secondly, from the difficulty of properly stacking and saving the grain in the present want of proper buildings.

The best method of taking care of the grain before threshing, unless threshing is done in the field—and this is a very wasteful process—is, in my opinion, putting it into open barns, thus securing good ventilation, and avoiding the common evil of waste from bad stacking and heavy rains. In England, with a very humid atmosphere and no violent rains, stacking is preferred, as keeping the grain in better condition; and stacking and thatching of stacks is there done with great thoroughness. In our usually dry climate wheat can remain in barns uninjured, whilst our occasional violent rains will penetrate almost any stack. By housing wheat early, moreover, we get a clean straw, which can be very advantageously used in farm economy, as feed, litter, etc.

Threshing grain is the least satisfactory of our improved processes. The old days of the flail, and tramping out with horses, are almost preferable to the present state of things. Threshing the present year, in several places in my neighborhood, has cost from 18 to 25 cents per bushel, or from one-third to one-half of the entire cost of production, which is 50 to 60 cents per bushel. A man with a flail could do as well as that, and probably more cheaply and better.

Of varieties, red and white May are generally preferred with us.

DISCUSSION.

Mr. FLAGG—I would like to call upon Mr. Fangenroth, of Madison county, who is giving much attention to the growing of wheat, and who is largely experimenting with the different varieties.

Mr. FANGENROTH—I am sorry that I cannot give the information that I would like to do. I can only speak of one kind of wheat, that is fall wheat. I have had no experience in growing spring wheat. I must say here that wheat lands may be made very productive. I have for the last four or five years raised wheat in defiance of insects, rust and mildew. I will endeavor to give you my experience.

First, in regard to my method of plowing for wheat. It has been said that trench plowing for wheat is injurious; it was so considered in my neighborhood when I undertook it. But I have practiced it for a number of years, and to this I now attribute, in a great measure, my success. We have generally had, in our neighborhood, failures in a wet spring, and have inferred from that that the wet spring was the cause of the failure. Now if we can overcome this difficulty by trench plowing, as I believe I have, I think we ought to succeed. When I came upon the farm which I now occupy it was considered worn out; the failure of crops was a common thing. It had never been trench plowed, but had been plowed only in the common shallow method.

Mr. DUNLAP—How deep?

Mr. FANGENROTH—Not more than three or four inches deep. The land was considered worn out. The first time I put in the trench plow I was not able to get down more than two and a half to three inches deep, for the reason that the ground was "furrow-trod," and so hard that it could not be plowed. At each additional plowing I went a little deeper, until this fall I have plowed my ground thirteen or fourteen inches, using the subsoiler, for the reason that I could not run the trench-plow deep enough. That which first led me to the practice of deep plowing was to get rid of the superabundance of water on the land in the spring, which seemed to be producing the frequent failures that occurred. Fall wheat, in particular, requires an early spring in order to ripen well.

I attribute also my success, in some measure, to the care I have used in selecting my seed, and if wheat growers would experi-

ment with different varieties of wheat I think they would do well for themselves and for others also. Last season I grew nine varieties of wheat. Of these, two varieties, the California and Tuscarora, were injured by the rust, which also was the case with other wheat which stood thick upon the ground. I also have red Alabama wheat, white May wheat, red May wheat, blue stem and Tappahannock. These varieties were sown in precisely the same manner, and with the same quantity of seed. The only way to find out just the variety that is best for your soil and location is by trial. The man who lives and grows wheat upon a clay soil cannot prescribe for a man who lives upon a different soil. Timber lands are more favorable for wheat growing than rich prairie lands. Where the ground is not drained the soil on the prairies is later than on the hills. The difference is frequently between eight and ten days in the ripening of some kinds of wheat; I have, therefore, always advocated the view that those living on the prairies should sow the earliest wheat, say the red May and white May. The latter is a very superior wheat. Next comes the Tappahannock, which has not been as satisfactory as desired or expected. The bearded wheat has not been much grown in our section of the country.

In selecting seed wheat I always take the best, and that which ripens together. It is all selected in one day. I will not have shrivelled wheat for seed. With proper care in selecting seed, and in preparation of the soil, there is no difficulty in raising good crops of wheat where heavy crops of clover will grow. I repeat there is no trouble about it. I regard deep plowing essential to success. It matters not how deep you plow, whether five inches or two feet, there will be found beneath the plow a hard crust, known as "furrow-trod." I would say use the subsoil plow first, and when there is formed this hard-pan beneath then put in your drains. It is too expensive to tile drain first, and is economical to use the subsoiler, as it will answer the purpose of draining for a time. Wherever there are low places in the field you must put in your tile drains, if you have an outlet.

My method of plowing is also different from that of any with which I am acquainted. [Here the speaker went to the blackboard and drew a diagram of a field of fourteen acres.] If an oblong field, I commence in the middle of the field, throw up a *ridge* and back-furrow. I stop short of the ends of the field, a

distance more or less, according to the size and shape of the field. The object is to plow in such a manner that the field may not be left in the shape of a basin, to hold water, as is the usual method. When the land is plowed in a way to throw the dirt continually outward, leaving a ridge along the fence row, which prevents proper drainage, I back-furrow the whole field, throwing the dirt continually inward, and away from the fence row. This leaves the land elevated rather than otherwise in the central portions, as it should be to secure proper drainage and prevent, on rolling land, the washing away of the soil. If you plow in lands or "seed beds," in the usual way, the water will carry off much of the soil. My method also enables me to turn upon the unbroken land, better for the land and easier for the horses.

Some say, as we before stated, that trench plowing is injurious. It may be at first, if the work is done in the spring, just before seeding. It is best to trench-plow in the fall and seed in the spring. Deeply plowed lands will retain moisture and stand drouth without injury when crops planted on shallow plowed land would burn up. I would advise all farmers to try deep plowing. Do not go to the greatest depth at first, but deepen gradually, and you will have all the benefits and none of the evils of deep tillage. Plow in the fall, and plow early enough to give the weeds a chance to rot before the cold freezing weather commences. If you plow early they will have time to rot and furnish food for plants; if you plow late they will not rot, and will hinder spring plowing and be in the way of the growing crops. The young plants will grow as long as they find nourishment. If the season is dry they will not find sufficient nourishment in the top soil, and certainly not in the weeds turned under late in the fall and remaining unrotted. Those farmers who do not practice deep plowing may get a good crop in a wet season, but they will get a poor one in a dry. My wheat crop, on poor land, averages 24 bushels to the acre, with an average weight of 62 pounds to the bushel. In regard to artificial fertilizers, I would say I have used them slightly, and at the same time I have applied a sprinkling of barnyard manure, with no very important advantage to this crop, on my farm.

Dr. Gregory—What was the character of your season?

Answer—Very dry in the latter part of it, and wet in the spring. Our wheat is more injured by the dry weather than by

the wet. New ground is sufficiently porous for drainage purposes; clover roots furnish drainage downwards. Then plowing in the method I have described, throwing your furrows inward, you will finally get rid of surplus water. I plow with a right-hand plow, and, as before stated, the team turns on the hard ground, which makes it easier for them, and the plowed ground is not injured.

Dr. Gregory—Happening to be at Madison county fair, and seeing some fine specimens of wheat shown there, I begged for a few kernels to put in our cabinet, for the inspection and study of all interested in the matter. I now wish to request others to do the same thing, and send up specimens of the different varieties of wheat for the cabinet, and also for sowing here for trial. This is a matter of some interest and importance, and would doubtless do some good.

Dr. Gregory—I wish to inquire whether any one has tried the plan of mulching the wheat plants as we mulch the strawberry. Have you seen this tried?

Mr. Periam—I would say it has been practiced in Cook county with most excellent results. It prevents the heaving of the ground, which exposes the roots of the plant and breaks them. This heaving is caused by the constant subjection of the land to freezing and thawing. It throws out the roots entirely above the ground.

Another fact which I have observed, that the localities for wheat growing are traveling west. We can raise wheat on new lands, but as the soil becomes old and worn we fail to get good crops. Sod land is the best for wheat. Wheat does not freeze out in sod land. We see an illustration of this in the vigorous stocks in the fence corners.

Mr. Flagg—We have discussed pretty fully the preparation of the ground, and should now give attention to some other points. I therefore submit the following motion: I move to take up the question,

1. Of drilling and sowing broadcast.
2. The cultivation of wheat.
3. The time of cutting it.
4. Then of stacking it.
5. Next the question of threshing of wheat.
6. And, in the last place, the value of wheat as a farm product.

Adopted.

Mr. Robinson—In sowing wheat on the Illinois river we first summer fallow our ground. We plow our ground, if possible, in early summer, and pasture till fall. At seed time we plow again. I prefer, however, simply to run the cultivator. We sow about a bushel and a quarter to an acre. If the ground is weedy we sow a bushel and a half.

Mr. Jewell—I am here to learn from the people of this State. I am not acquainted with farming in this country. I consider that a farmer in Michigan is not necessarily a farmer in Illinois. That is, he may understand farming in Michigan and not understand it in Illinois. In Michigan my experience is to plow early, even before harvest, and then not plow any more, but harrow in the grain on this early plowing. The farmers of Michigan find that they can raise from 20 to 40 bushels to the acre by this method. Formerly they raised but 10 to 20 bushels. In Illinois I have no knowledge of wheat culture.

Mr. Fangenroth—I use the drill. If I can't use the drill I don't sow. I drill the same way that I plow my land, commencing in the center of the field and running with the furrows.

Mr. Flagg—How much to the acre do you sow?

Mr. Fangenroth—A bushel and a quarter.

A voice—How deep?

Answer—One and a half inches.

Mr. Jewell—I understand that you recommend the drilling of wheat. Our drill in Michigan is not like your drill. Our drill is not a tooth drill. The tooth drills are all being thrown aside for our Michigan drill, which is supposed to be worth two bushels to the acre more than any other drill. The speaker gave a description of the drill. It consisted of wheels instead of teeth, and acted on the principle of the roller. In Michigan, on sandy soil, they work admirably, but how they would do in this soil of yours I do not know.

A voice—Does this drill leave the ground level?

Answer—It leaves it just as the other drills leave it. I may say, from my experience, the nearer the top of the ground you place the seed the better off the plant is. It will have a stronger growth and be better able to resist the frosts of winter. I sow all the way from one to two bushels. I would prefer one bushel if the land was in good order.

Mr. FANGENROTH—Sowing should be delayed until the ground has settled, otherwise the seed will be buried at an uneven depth and cause the ripening process to be uneven.

Mr. JEWELL—In regard to thick and thin sowing. I have seen wheat thin upon the ground produce 30 bushels to the acre, and I have seen wheat very thick not produce more.

Prof. BLISS—In regard to the quantity to be sown, I would favor the thin sowing, and depend for a heavy crop on the care with which the soil was prepared. One half the amount, sown on well prepared soil, will produce more bushels of wheat than the whole quantity sown in unprepared ground. This is my experience on prairie soil. I would say three quarters of a bushel, with the drill, is enough. I usually sow one bushel; but the yield from three quarters of a bushel is usually as great as the other.

With regard to the time of sowing, and the raising of wheat in general, I think we must study the particular season, and put as many things as possible in our favor. Drainage is as important as anything. It is quite as important that you plow your ground early enough. It is essential that the plowing should be early if you have a heavy stubble to turn under, that it may have time to rot. If you sow too early the fly is apt to injure the crop. If too late the frost will injure it. I would say from the 20th to the 25th September is a good time as a rule. Where there is a good deal to put in you must run from the 10th of September to the middle of October. Late sown wheat is also liable to be injured by the rust.

POTATOES.

A LECTURE BY JONATHAN PERIAM, SUPERINTENDENT PRACTICAL AGRICULTURE, ILLINOIS INDUSTRIAL UNIVERSITY.

The Potato, miscalled Irish, and botanically known by the name of *Solanum tuberosum*, or Tuberous-rooted Nightshade, is said to be found growing indigenous from Carolina in the United States to Peru in South America. It belongs to the vegetable order *Solanacea*. Among the edibles in this order of plants are the Tomato, Potato, Egg Plant, Pepper, the Ground Cherry, and that plant of doubtful utility, Tobacco. As a food producing plant among civilized nations, the potato ranks second in importance, has added millions to the human race, and has averted those famines which formerly swept over Europe, occasioned from a partial or total failure of the grain crops. An entire destruction of the potato crop, as was some years feared, would bring gaunt famine and death among the poor throughout the civilized world. It

may be well, therefore, to consider the history and diseases of this esculent, containing, as it does, so many elements conducive to human health, whose increased or diminished productiveness carries with it so much of weal or woe to the human family.

The natural history of the potato leaves us in some doubt as to its original nativity. It was carried to England, in 1565, by Sir John Wamkins, from Santa Fe de Bogota, where it is found growing wild, at an elevation of from 8,000 to 13,000 feet above the ocean, in elevated valleys surrounded by high mountains, and above the range of Indian corn. The climate is dry and cool, and, being near the equator, is not subject to great extremes of heat and cold. An attention to this fact will be of advantage to cultivators of this crop in climates not so well suited to it. It is said to have been known, at that early day, in various parts of North America; and after its introduction into England from Virginia, by Sir Walter Raleigh, in 1586, it began to attract more and more notice, until, at this day, the potato, as one of the root crops, and maize among cereals, have been among the most valuable food producing plants ever bestowed upon man. From a history of the potato, by Bonjean, published in 1836, and translated by Henry Meigs, we find the following: That it came originally from the intertropical parts of the American continent; that it grows spontaneously from Carolina to Valparaiso, in Chili.

The celebrated Joseph Pavon, one of the authors of the Peruvian Flora, found it growing wild in the vicinity of Lima, Peru, where the Indians cultivated it abundantly for their subsistence. Lopez de Tomera, a Spanish priest, in his general history of the Indies, published in 1553, mentions the *Papas*, the name by which it was known to the Indians. Joseph Acosta says that the Peruvians employed it in lieu of bread roots, which they called *Chunno*, or they ate them fresh and boiled.

Before its introduction into England it had already been very extensively diffused throughout the south of Europe. The botanist, Charles L'Ecluses (Clusius), about the year 1588, is said to have been the first European writer who mentions the potato. In 1631 he published a description of the root, and says that it was then so common in some parts of Italy that it was eaten by men and fed to hogs. He doubts whether it was known to ancients; thinks that it may have been the *Arachidna* of Theophrastus. Cortusus, another botanist, supposes that it was the *Pycnocoma* of Dioscorides. In 1590 Gaspard Bonhin received from Scholtz a colored drawing of the potato, and recognized it as a Solanum. Mathiola afterwards described it in his commentaries upon Dioscorides.

It was in Italy that potatoes were first cultivated to any extent, and from thence it began to be spread over Europe, about the year 1550. The Italians called them Tartoffoli, or ground huffles, and from this is said to have come the German name, Kartoffle. Parmentier, in 1783, succeeded in introducing the potato into general cultivation in France, and spent much time and research in demonstrating, by chemical experiments, that the potato was both a healthful and nutritious food. The following is a summing up of an analysis of the potato, by the author first quoted, Bonjean:

Starch, peculiar animal matter, bitter aromatic resin, Parenchyma (fibrous matter), Solanin, Asparagine, colored Albumen, a sugar principle, a gum principle, citrate of lime, citrate of potash, phosphate of potash, phosphate of lime, free citric acid, Silica, Alumine, Magnesia, Manganese, oxide of Iron, Iode, Brome and water of vegetation.

An analysis of the Mercer potato, conducted by Charles T. Jackson, M. D., of Boston, Mass., gives in 100 parts by weight:

Water	75.80	per cent.
Starch	12.54	"
Cellulose	2.62	"
Other matters, not separated	8.04	"
	100.00	

In an analysis of the ash of the potato, according to Professor Norton, it contains:

Carbonic acid	10.04	per cent.
Sulphuric acid	7.01	"
Phosphoric acid	11.03	"
Chlorine	2.07	"
Lime	1.08	"
Magnesia	5.04	"
Potash	51.05	"
Soda	trace.	
Silica	8.06	"
Iron	0,05	"
Charcoal in ash, and loss	0.07	"
	100.00	

After its introduction into England, by Sir Water Raleigh, it was cultivated in Ireland in 1610, in Alsace in 1720, in Scotland in 1728, in Switzerland in 1730. Since this time its cultivation has been extended to every civilized country, and many barbarous ones, from the equator to the 64th parallel of north latitude, has added millions to the population of the earth, and has rendered almost unknown those famines which so often desolated the civilized world. Indeed, it has been said that if the sanguinary wars of the French revolution had occurred before the introduction of the potato, that Europe would have been decimated by famine.

How thankful then ought we to be, even in this day of degenerate potatoes, that they are left us at all, and how well spent would be the life of that man who could restore to us the potato in its original vigor and productiveness.

Very many theories have been, from time to time, promulgated relating to the deterioration of the potato, principal among which are degeneration, or a wearing out of its vital forces, which nature herself has disproved by recuperating, in a measure, this valuable esculent.

Another theory is that the disease is produced by excessive cultivation and high manuring, thereby inducing an extremely succulent and watery growth, and consequently a greater liability to be affected by atmospheric and other changes which are constantly taking place. That it is due to this cause, *measurably*, is patent to my mind, from the fact that the potato, when given its

normal condition, *i. e.* a cool and equable temperature, allowing it to make its growth without subjecting it to violent atmospheric changes, it uniformly produces fair crops, as, for instance, if we plant early York, Sebeg or Goodrich in this latitude in March, upon new or fibrous soil, however well manured, we may confidently expect to harvest a good crop about the first of August; and also, if we plant in June, we may expect to gather a crop in September or October, if the season is proper, that is, not wet and hot; these are conditions that are not suitable to a healthful growth of the potato. In fact, a season that produces good wheat is apt to produce good potatoes, but a season that is subjected to violent extremes of heat and cold, especially upon highly manured soils, is sure to deteriorate and reduce the potato crop.

The present season, for instance, was noted for an excessively hot and dry June and July; now if these months had been alternated with wet and cold, as well as heat, it would have followed that the potato crop, both early and late, would have been totally destroyed, but the early crop having covered the ground with their vines before the extreme drouth set in, they were enabled to mature a fair crop. Those planted later succumbed to the drouth, while those planted late in June grew slowly until the fall rains set in, and then perfected a reasonable crop.

Now the effect of high cultivation, and strong and especially green manures, is such as to induce an extremely succulent growth of vines, and while in this condition, if such weather occurs as would cause rust in the wheat plant or rot in fruit, the cells, being gorged with sap, are ruptured, and decomposition taking place, it is immediately seized upon by microscopic fungi, and unless seasonable weather succeed the poisonous matter is communicated to every part of the plant, and a total destruction of the plant ensues. That it is due to atmospheric causes, in a great measure, there is no doubt, and it is also as true that a hot murky atmosphere is the superinducing cause.

Indeed, the disease has not been confined exclusively to the potato, for, about the same time, we have accounts of similarly affected bulbs and roots, as tulips, hyacinths, the sweet potato, various vegetables and fruits, as tomatoes, the yam, the cocoa, apples, peaches, pears and other fruits. That it is due to engorgement, or something analagous, I believe—the rupture of the plant cells presenting a proper nidus for microscopic insects and fungi, the vitality of the plant is more and more impaired, until finally, as in the case of annuals, they are completely destroyed; but perennials may linger from year to year, until they finally succumb, or, during more favorable seasons, eventually recover. This is a principal reason that we find certain plants growing within certain isothermal lines, or where the temperature is natural to them, and it is not strange that the potato, requiring as it does such peculiar conditions for its normal development, being transplanted to such a variety of climates, should become diseased, and the seeds of that disease be carried, perhaps, to every country where it is cultivated. It is to be hoped that the examinations now being made, relating to microscopic fungi, under the auspices of our State Horticultural Society, and also by scientific individuals, may ultimately lead us to the point from which we may more satisfactorily account not only for this but other mysteries connected with plant life.

Under the influence of heat organized bodies expand. So do some at least under the action of cold, taking 32 deg. Farenheit as the initial point; under the influence of electricity, however, some are resolved into their component parts; under the action of heat and moisture, the circulation of plants becomes active, and under that of light, plants, through their leaves and otherwise, form their organized structures, from organic and inorganic materials. All material substances exist either as solid, liquid or gaseous. Chemistry teaches us that all substances consist of atoms. We know how inappreciable the spores of microscopic fungi are; that, under a power of 500 diameters, some are so infinitely minute that they are scarcely perceptible, and yet they are *composed of atoms*, a single one of millions. Perhaps there exist animalcula so small that it would take many millions aggregated together to become visible to the natural eye of man. Now since atoms mass from everything with which we are acquainted, their arrangement implies contact, and who shall say that the attraction and repulsion of these atomic bodies may not produce disorganization, decay and death.

Atoms, however, remain unaltered. They are unchangeable and indestructible. But organized substances are destroyed or changed according to the arrangement of their component atoms, and herein a field for the chemist lies. In determining the true condition of matter in the healthful plant, and the variable modifications produced by abnormal agencies, not in the abstract, but as by means of external and internal influence, as, for instance, in what manner the normal condition of plants are changed by various agents, since all matter is made up of proximate atoms. So do the various combinations of atoms produce and reproduce everything visible and invisible—the air we breathe, the forest, the microscopic animalcula, or the prize ox, swelling with fatness. And so does an abnormal arrangement of these atoms produce disease, decay and death; not by degeneration, but from disorganization. And the student in vegetable physiology, who solves the problem relating to the derangement of vegetable organisms, and the means of prevention, even proximately, will deserve as well of his fellows as the savior of a nation. In the meantime we must use such means as we already can compass.

I have already stated that the potato required a cool equable climate. Michigan and Wisconsin are celebrated for their fine crops of potatoes, so are Maine and Nova Scotia. Now it is known that the climate of Michigan, nearly surrounded as it is by extremely deep water, and protected besides by dense forests, has a comparatively equal climate; it is warmer in winter and cooler in summer, not subject to so violent alternations of heat and cold as are the more open countries in the same latitude lying west of Lake Michigan. In fact the delicate Carter potato is successfully grown on the eastern shore of Lake Michigan, 200 miles north of Chicago, upon the clearings of the dense forests, for the reason that their summers, although short, are marked by a steady degree of heat and moisture, sufficient to mature the crop; so of Maine and Nova Scotia.

Wisconsin is subject to greater atmospheric variations, lies nearer the great treeless prairies, but is at the same time sufficiently protected to be exempt from the more violent extremes.

Indian corn requires a much greater average heat to mature its crop than the potato, but at the same time it will stand greater extremes of heat and cold. The least frost blackens the potato vine, but the corn simply turns yellow, subsequently recovers, and under favorable conditions as to moisture and heat matures its crop.

Let us look for a moment at the theory of degeneration as producing the potato rot. It is essentially this, that reproduction, by extension as by layering, by cuttings and by eyes, tends to so impoverish the vital energy of the plant from generation to generation, that it continually becomes more and more weakened, until finally it dies. Now plants, as well as animals, may be called both viviporous and oviporous, not scientifically, but, if I may be allowed the word, as a condensed illustration; and some plants, as the potato, dahlia, artichoke, etc., are both oviporous and viviporous—oviporous as reproducing themselves from seeds or ovules, and viviporous, reproducing themselves by tubers, or offsets or buds. Now the seed, in order to reproduce the living organism, must first undergo certain changes, must be placed in its nest and be hatched; but in reproduction from the bud, it is fed by the sap itself until it has put forth its roots and leaves and is enabled to draw from the earth its proper nourishment. It seems to be a law of nature that the more we refine either the animal or plant, the more susceptible it becomes to climatic and other changes; that the more we refine the more delicate becomes the tissue; that the higher we feed the more liable are we to engorge, and with engorgement comes rupture, disease and death. We have forced the potato, by high feeding and extreme culture, into excessive growth; under certain atmospheric or other conditions, engorgement ensues, the cellular tissue is ruptured, the vitiated sap decomposes, fungi attacks it, and unless assisted by other conditions favorable to the normal condition of the plant, finally ends in its complete destruction, or partial disorganization, leaves it in so feeble a condition that it is not able to fully elaborate its starch, and instead of the dry, mealy potato, we have the soggy, waxy and watery one. It is no argument, for it is only a theory, against the theory that reproduction from seed does not bring it back to a healthful condition, for the seed being but a minute part of the whole plant, may necessarily be diseased from the parent, and might, perhaps, continue so for generations, until it wears out, just as fever and ague wears out upon the human patient. But under fortuitous circumstances, it may at last regain its original health and vigor. That it has not done so yet is apparent from the fact that to-day there is not in the United States a potato that combines the good qualities of the Mercer potato for an early variety, or, for a late variety, the pink eye of thirty years ago.

Horticulturists recollect the consternation that was created by disease and death in the apple orchards of Southern Illinois a few years since. It was laid to a variety of causes, principal among which was the theory that root grafting was the cause, producing disease and decay, or in other words it was degeneration, or a wearing out of the plant from decreasing vitality. Careful observation, however, showed the roots to be infested by the apple tree root-louse (*Pemphigus Pyri*), and now, under the microscope, we find fungoid

growth also, which may eventually be proved to have as much to do with it as anything else. The warty excrescences, produced by the Aphis perhaps, inducing fungoid growth, and a poisoning of the whole texture. It is a great field that is being opened, this one of microscopic examinations, and facts are proving every day that our best teachers are those who are investigators as well.

It may and does seem to many persons, otherwise intelligent farmers, that this labor of investigating the nature of microscopic fungi, both Phænogamous and Cryptogamous, so minute, as has been before stated, many of them, that under a microscope magnifying 500 diameters, the spores appear only as a fine mist, and it is quite probable that these tiny vegetable atoms may cause the loss of our potato crop, destroy our orchards, and render futile the exertions of the agriculturist. It is eminently proper that our legislators should foster institutions having for their aim the diffusion of scientific knowledge, relating to chemistry, botany, vegetable physiology, mechanics and microscopic examinations, connected with the arcana of animal and vegetable life.

It is to be hoped that the Legislature of the great State of Illinois, one of whose citizens conceived this grand idea of industrial education, the education of the masses to their several pursuits in life; we say that we hope that the State of Illinois will not be allowed to fall behind in this great scheme of industrial education because we have not the purse of a munificent and philanthropic Cornell among us, but will especially foster those schools which have for their aim the education of the industrial classes—the farmer and the artisan; one of which shall more easily feed the multitude, and add millions to the population, while the other shall harness yet undiscovered powers—an Archimedean lever that shall move the world.

The history of potato culture in Illinois shows plenty of failures, resulting from plantings in the month of May and early in June, for the reason before stated that the hot sun and dry atmosphere of July and August, or else the sudden alternations of wet and dry, hot and cold, are not conducive to the steady growth which the potato requires. But even under these circumstances, we may measurably succeed, by mulching, when the conditions are such that early planted ones do not perfect their growth before the heat of summer ensues. My own practice, upon clay or heavy loams, has been to plant as early in the spring as possible, upon deep fall plowing, by marking the land three feet apart, making a deep narrow furrow, which will of course be left filled with the fine earth. If you plant in hills, mark the other way, two feet apart, and put two strong single eyes in each hill. If in drills, plant the eyes about ten or twelve inches apart, stepping upon each piece in order to press it firmly into the earth, or if two rows are planted at once, this must of course be omitted, in which case a roller may be passed over the land before covering by the cultivator or hiller. Notwithstanding the assertion that it makes no difference whether the eye lies uppermost or not, I consider it bad practice to allow some eyes to lie up and some down, since they do not appear above ground at one time. Have them lie in the furrow as they are to grow, the eye up; cover about four inches deep. As soon as the weeds start, or the ground becomes encrusted, harrow thoroughly with a light drag,

and continue to do so as often as necessary, until the rows can plainly be seen, then, with any suitable implement, turn a light furrow away from the potatoes, and within four or five days turn it to them again, and continue to earth them from time to time, until at the time of blossoming the vines will be supported by a moderately broad and high hill. If the vines now grow so as to cover the ground and shade the ridges or hills, you may confidently expect to harvest a crop, unless the season is unfavorable, that is, wet and hot, or with alternations of heat and cold. I have gathered fine crops by filling between the hills with litter or fine manure, to obviate the effects of heat and drought. What the potato most craves is a moist, equable temperature of the earth, which can only be obtained, in variable seasons, by having the ground covered with the vines or mulch. If these conditions are secured you will not be much troubled with weeds, but if so you must get them out by hand or otherwise.

Neither potatoes nor any other crop will thrive among weeds. In case blight attacks them severely cut the tops, but if slight leave them alone—they may recuperate; and in no case, when attacked by disease, should you dig them to save them, they are safer in the ground than out, unless the land is very wet, in which case, if they are dug, they should be spread thinly, and some absorbent, as lime, powdered charcoal, or dry muck, mixed with them. When thoroughly ripe they may be dug and placed in narrow piles to sweat and dry, after which they may be stored where they are to remain through the winter.

I have often been asked whether I would plant certain seeds in the old or new of the moon. This planting in the moon, as it is called, is mere heathenish superstition, but like other pagan practices, which some of us follow, has fact mixed up with error. Seeds sprout more quickly in the dark and grow faster in the light, and therefore if we plant that which is slow to germinate, as the potato, in the old of the moon, it has the dark nights in which to break, and appearing above ground just as light nights come on, it absorbs carbon, grows apace, and vice versa. If we plant peas, which germinate quickly, in the new moon, *they* have the light nights to grow in; and so the fogyish, unscientific and superstitious planter has the facts on his side, only he does not know *why*. Therefore, if you must plant potatoes late, do it in the old of the moon, if it comes after the middle of June, but in this latitude I should prefer to plant, especially if early sorts, the first of July, rather than the first of June.

This brings us to varieties. After having tried all the new sorts, except such as sell at one to three dollars per pound, I still plant Early York, or Buckeye; if it is Buckeye, in March, for early, and in June and July for the late crops. And now about sorts. Last season I found but little difference in productiveness between Early Goodrich, Chenery and Sebeg; they ripened about together. Early York, however, produced the best crop. A new sort, Titacaca, said to have been brought from a lake of that name in South America, was two weeks later in ripening, and were perfectly hardy in tuber, seed and vine. The first eatable potatoes were produced upon Chenery, June 15; upon the 20th Goodrich, Sebeg and Early York were eatable; Jackson White

Calico, Peach Blow and Harrison were affected by the drought to such a degree that they were a very light crop. They were all planted March 21st. More attention should be paid to the storing of potatoes than is generally allowed. Those intended for eating should be kept as much as possible from the light and air, and all potatoes should be kept at such a temperature as to prevent germination; but potatoes intended for planting certainly sprout more kindly and more quickly if they are exposed to the air sufficiently in the fall to become even greened before storing, on the same principle, perhaps, that the roots of trees dug in the autumn and healed in, get calloused and ready for growth in the spring. The planting of small potatoes cannot be too much deprecated, and why otherwise intelligent farmers will practice planting inferior and small potatoes, and at the same time be so careful in saving seed of corn and other cereals, is something wonderful. I have reduced a crop one-half in four years by the experiment.

A single strong eye, with a liberal quantity of tuber attached, is as good as more. In planting whole potatoes none but the strongest eyes grow, while if all the apparent eyes are cut out there will still be latent eyes, which, under favorable circumstances, will germinate. The small potatoes, however, in this day of high prices, may be utilized thus: Select a certain portion of the best potatoes, sufficient for the seed of the next year to be saved from, and if you continue this practice from year to year, you may plant the small potatoes for the market crop; but in no case must seed be saved from the produce of these small potatoes.

It is not necessary that we send long distances for change of seed. I have proved, from my own experience, that plants will not degenerate if care is taken to save seed from the best specimens, but will, on the other hand, improve.

DISCUSSION.

Mr. Parks—I would like to ask for the experience of potato growers in regard to the Colorado potato bug. I wish to learn whether this bug attacks the potato in its perfect state.

Mr. H. Dunlap—Yes; they will attack the potato patch in the spring, and literally eat it up.

Mr. Periam—I may state that I have watched this thing. I have not seen them actually feeding upon the potato in the spring, but I have found holes in the potatoes that might have been made by this insect. My experience extends only through two years.

Mr. Daggy—I think I have seen the perfect insect feeding upon the young plants in the hot-bed, early in the spring.

Mr. H. Dunlap had seen the same thing, and had his attention particularly called to it.

Mr. Rice inquired whether potatoes should be planted in hills or drilled.

Mr. Periam—You will get one-quarter more crop in drills. It is a question of time and labor. If you have time and labor enough plant in drills, otherwise in hills and in rows—both ways, so you can work with horse-power. I would prefer, in large fields, to plant in hills, three feet apart one way and two feet the other, just sufficient to get through.

Mr. Miner—I would ask in regard to sod land. Can we succeed in sod land in growing large crops of potatoes?

Mr. Periam—The finest crop of potatoes that I ever raised was by dropping the potatoes under prairie sod every other row. Still I do not think there is any economy in planting under sod if you have other land. It costs more to dig them from sod land. You must plow in the fall if you would raise a perfect crop of potatoes, and not fail in the spring to bring the ground into perfect condition.

Mr. Colman—I would prefer to turn over the sod in the fall if I wished a crop of early potatoes. I recollect one season, I did not plow my ground until May or June, and planted my potatoes in July, and started out on a lecturing tour, returning on the 8th of August. On examining the potato patch, found no potatoes there. Was again absent for six weeks, and when I came back I never saw such a crop of potatoes! I could not dig them all. [Laughter.] I would always recommend planting potatoes on sod land. The sod decays and furnishes excellent fertilizing material, suited to the potato.

A voice—Did you trench-plow?

Mr. Colman—No, sir; the season was rainy and just such as suited this crop.

Voice—What kind of potatoes?

Mr. Colman—Neshannock.

Mr. Galusha—I have raised excellent crops of potatoes on sod, but the labor of digging is considerable, if dug in the usual way. This labor may be saved by taking the plow and turning the sod back again. The potatoes do not go into the ground, but lie just under the sod.

Mr. Robinson—I have been in the habit of raising potatoes on sod, with the best results. I turn two furrows. The first furrow is turned just as shallow as possible, to get a firm sod, and the second furrow *just as deep* as possible.

Mr. Colman referred to the method of growing potatoes under straw, and said that they would bring ten cents more per bushel in the market.

ROOT CROPS.

A LECTURE BY JONATHAN PERIAM.

Root crops may be classified as follows: First, those having long tapering tap roots, more or less fusiform, as the beet, carrot, parsnip, radish, turnup and salsify or vegetable oyster. Second, tuberous rooted plants, as the common potato, the sweet potato, Chinese potato or Japanese yam, the chufa or earth almond, and the artichoke, and bulbous roots, as the onion, leek, shallot, garlic, etc. These, therefore, hold before enlightened nations a most important place as sustainers of animal life, increasing always in importance according to the density of the population. Only within the last one hundred years have they occupied their proper place in the economy of animal life and the rotation in farm cultivation, and have enabled Great Britain, especially, to keep pace measurably in her agricultural development with her commercial and manufacturing interests.

The rudest form of husbandry known is the occupation of a herdsman, but one remove from savage life, inasmuch as the savage hunts, kills and eats wild animals, and the herdsman breeds, slaughters and eats domesticated or half-wild cattle.

From thence, by another step, we have the cultivation of cereals, then the planting of vineyards and orchards, and lastly comes in the cultivation of roots, herbs and flowers. A combination of these arts results in agriculture, horticulture being but a branch thereof, (the poetry of agriculture,) pomology, arboriculture, floriculture, etc., being subdivisions again of horticulture, just as the breeding and fattening of stock, or the cultivation of the cereals, or of the grasses for hay, are subdivisions of agricultural art. Science, in a high degree, can only be displayed by an individual in the study of one of these branches, and yet this subject, agriculture, has been too often looked down upon as being only fit to be subordinated to every other profession and art in life—this agriculture, which feeds the millions, and actually sways the destiny of nations.

It is altogether useless for the slovenly or negligent farmer to attempt the cultivation of root crops, since being of slow growth at first, produced from minute seeds, and requiring much labor, as compared with corn, wheat and other grain producing plants, he will be sure of failure. In fact, the so-called gardens or truck patches, of many otherwise good farmers, are a by-word and laughing-stock to the passer-by, the home of every vile weed that will grow in the climate.

There certainly is need of Agricultural Colleges in a country where more than one-half of the farmers are content to live for three-fourths of the year on bread and meat, with perhaps a scanty and precarious supply of vegetables, when one hundred dollars, expended in seed and labor upon a single acre,

would produce more healthful and better sustenance than double the amount expended in pork and flour, and doctor's bills, besides the enhanced pleasure in a higher enjoyment of life, produced by a table laden with various vegetable productions, important among which are tuberous and other root crops.

It is absolutely essential to success in the economical cultivation of these crops, that the land be in high condition, or it will be necessary to bring it so by deep plowing, heavy manuring, and the cultivation of some hoed crop of easy culture, as corn and potatoes.

Attention is also necessary to the nature of the soil. If it is wet or tenacious it must be rendered dry and friable by drainage and manures, which will act mechanically as well as chemically, always bearing in mind that root crops, except alliaceous ones, as the onion family, do not like recent manuring, unless it be compost, since it causes them to grow forked and knobby. The time spent in properly preparing the land will be amply repaid in the perfection and quantity of the crop. We stated in this morning's lecture that the potato ranked second among vegetable productions as a sustainer of human life. I now state that root crops come next in the scale of value as food-producing plants, and rank as follows: In that class, the beet, carrot and parsnip—all as esculents; and also the beet as a sugar-producing plant, the carrot as a promoter of digestion, and the parsnip for its saccharine qualities and as an excitant to the appetite. In the second class named in this lecture the common potato has already been noticed this morning. The sweet potato is well known for its saccharine and other nutritious qualities. The Chinese potato (*Dioscorea Batatta*), like other humbugs, has had its day, and therefore needs no other mention, but the chufa (*Cyperus Esculentus*), or earth almond, I think ought to have a place upon every farm. It is a perennial plant of easy culture, the foliage being grassy or rush-like. The tubers are produced at the end of creeping roots, varying in size from a hazlenut to that of an almond, which, when dry, they very much resemble, and are a highly pleasant and nutritious food, especially sought by children. Their cultivation is easy. Plant the tubers in May, in drills two feet apart, by six inches in the row, cover two inches deep, keep them free from weeds, and dig and dry them in the fall after frost comes.

The Jerusalem Artichoke (*Helianthus Tuberosum*) also is another plant which I think is generally under-estimated. It is of easy culture. It is not so rich in fat-producing principles, but in nitrogenous matter it is richer, as in sugar dextrine, albumen and casein, producing nerve, muscle, etc.

The next in the list for consideration among root crops are bulbs. The only one of principal importance, in an edible or sanitary point of view, being the onion (*Allium Cepa*), and deserves more than a passing notice. Notwithstanding the fact that over-fastidious persons object to its use, it still holds its rank, as it did among the ancient Israelites, as being one of the first among vegetables. It belongs to the same natural order (*Liliaciæ*) as asparagus, the hyacinth, tulip, squills, etc. The onion delights in a rich mellow loam, resting upon a dry subsoil, heavily manured with rotton manure. A good preparatory crop is peas, the land to be kept clean by frequent plowings; after removing that crop more manure may be added and a crop of

turnips sown after, which will leave the land in a fine condition for the next season's crop. Make the land thoroughly fine by repeated harrowing and rolling, it having of course been fall plowed deeply; sow the seed in drills fifteen inches apart, leaving the plants close enough in the drills so that they will not crowd each other when swelling, at which time it is beneficial to draw the earth away somewhat from the bulbs. Do not work the ground deeply, but keep the surface mellow, that it may easily absorb the dew and rain; when the tops are dry the crop may be pulled and thrown into thin windrows to harden and mature, after which they should be stored thinly in a cool, dry place until wanted. The cultivation of garlic, shallot and top-onion are identical with that of the common onion, except in the case of the garlic the cloves are broken off and planted, and shallots and top-onions are produced by separation and planting of the small bulbs. The cultivation, as with onions, is to keep free from weeds, and gather when dry.

The cultivation of the sweet potato (*Convolvulus Batattas*) is attended with considerable expense, but not so much as to preclude its cultivation as a field crop in the central and southern portions of the State. About the usual time that farmers commence plowing for corn the whole tubers should be laid upon a gentle hot-bed, upon about three inches of sand, on good earth, placing them about two inches apart, and covered with four inches of leaf mould or some other exceedingly friable soil. The land where they are grown should also be made as mellow as possible by deep plowing and thorough working. The ridges upon which they are to be planted should be raised, in any convenient manner, as high as possible, three and a half feet apart, and the slips planted therein at a distance of sixteen to eighteen inches apart, and kept perfectly free from weeds, and the vines not allowed to root from their joints. They should not be planted, however, until all danger of frost is over, and the ground is thoroughly warmed by the increasing heat of the sun. In the autumn, if the season has been favorable, a crop ranging from 100 to 200 bushels, and occasionally to 300 bushels, per acre, may be expected.

Beets, parsnips, carrots, salsify, ruta baga and turnips, in garden culture, should be sown in drills about sixteen inches apart, and thinned in the row to about six inches, except ruta baga and turnips, which should be thinned to twelve to fourteen inches apart.

Radishes may be sown in drills one foot apart, and thinned to about three or four inches.

We now come to the field culture of the beet, parsnip, carrot, ruta baga and turnip. It is not for a moment to be supposed that the cultivation of root crops are of any economical value as compared with the corn crop, as estimated according to the value produced for a given amount of labor. If it costs ten dollars to produce an acre of corn, yielding fifty bushels, it will cost eighty dollars to produce an acre of beets, yielding 1,000 bushels. Your corn stands you in twenty cents per bushel, your beets stands you in eight cents per bushel, therefore we can produce 400 bushels of corn for the same labor that we can 1,000 bushels of beets.

Ruta bagas and turnips will cost somewhat less, but are not so good for feeding.

Parsnips and carrots will cost as much as your beets, and will not produce so much per acre, but are richer for feeding.

Consequently, it is useless to argue with the stock farmer, at the present time, to prove the economical value of roots as a fattening crop, when raised upon old and recently manured land, but place root crops in their proper place in the rotation, and they will make a different exhibit.

In breaking up a clover lay, trench-plow a portion of it in the fall ten inches deep, paring the sod as thin as possible. Harrow and roll in the spring, when dry, until it is perfectly friable, drill your beets in before corn-planting time, thirty inches apart, tend with a horse as much as possible, and besides once thinning and once hoeing, you should have but little more to do until they are gathered. This will reduce the cost one-half, and you may confidently expect from seven to nine hundred bushels per acre.

Ruta bagas may be sown upon sod. Trench-plow in the spring, say about May 20th to June 1st, and turnips, broadcast, after early cut grass, or even as late as August 1st.

Mangle wurzel beet is the sort particularly adapted to field culture, from its habit of growing one-half of its length out of the ground, and instances are on record of fifty tons having been produced per acre. It is eaten greedily by cattle, sheep and hogs, both tops and roots, and four bushels will fatten as far as one bushel of corn, as usually fed, and they leave the land in the best possible condition, without replowing, for any crop of small grain.

But it is especially to the farmer of but few acres, who wishes, nevertheless, to fatten as much stock as possible, in order to keep up the fertility of his soil, that root crops are particularly valuable. Upon the farm of 160 acres, and less, half may be devoted to grass and hay, twenty acres to root crops—beets, ruta baga, turnips, carrots, parsnips and potatoes, as follows: ten acres to beets, five acres to ruta baga and turnip, three acres to potatoes, and two acres to carrots and parsnips, the latter two to be fed to horses and milch cows, twenty acres to wheat or barley, twenty acres to corn, and twenty acres to oats or rye.

In the rotation here mentioned, the manure should be applied to the corn land and the sod before trenching for the root crop.

Within five years I should not be afraid to guarantee, if all the crops, except wheat, barley and potatoes, were fed to stock, and the manure saved and faithfully applied to the land, that the produce of the farm, in each ordinary season thereafter, would be, starting with good arable prairie land, faithfully worked, 160 to 200 tons hay, or its equivalent in meadow, 15,000 bushels beets, 5,000 bushels ruta baga and turnips, 600 to 900 bushels potatoes, and 800 bushels each of carrots and parsnips. This would give nearly 22,000 bushels of roots, besides potatoes, which should produce 50,000 pounds of beef, mutton and pork, annually, which, at five cents per pound, would amount to $2,500 per annum, as the product of the twenty acres, besides the value of the potato crop.

But it is to the villager, or occupant of from one to five acres, that the cultivation of root crops are especially valuable. We have shown the quantities of the different root crops that can be raised per acre, and they are not fancy

sketches by any means, but are far below what are often raised. I myself assisted, when a mere boy, in the cultivation of two-thirds of an acre of ruta bagas, in 1839, the produce of which was 1,300 bushels per acre, individual roots weighing twelve to sixteen pounds each; and I have also in mind a prize crop of parsnips raised in the Isle of Jersey, in 1839, of 27 tons 8 cwt. per acre—30 tons 1,440 pounds of the present day—1,229 bushels per acre, at 50 pounds per bushel. The carrot will produce, usually, more than parsnips, and four bushels are considered as good for feeding as one bushel of corn meal. The principal value of carrots, however, is in feeding with grain, from its peculiar principle pectine, and its action on the digestive organs, enabling them to more readily assimilate the other food. But to return to the village farmer. Half an acre in beets will produce 750 bushels, and the mature leaves, stripped off from time to time, will feed a cow at night and four hogs principally during the summer and fall, and give for feeding, for six months in the year, over four bushels per day, which will fatten one cow and feed another for milk; and a quarter of an acre of parsnips will thoroughly fatten the four hogs, besides feeding four more growing ones until the next spring. Thus the village farmer of five acres may raise one and a-half acres of beets, parsnips and potatoes, half an acre of other vegetables, one to two acres of strawberries and other small fruits, besides corn and other crops.

The sugar beet, I believe, is destined to work a great change in the husbandry of many portions of our prairie land, and I see no reason, judging from its success in France and Germany, why it may not only supply us with sugar, both for consumption and export, but, in the vicinity of the establishments for its manufacture, so alter the system of rotation, as to be of great benefit to the farmer. Its success once established, will add millions to the agricultural wealth of the State of Illinois. It may be brought into the rotation once in four years, or oftener by the application of manure. A good rotation, where cattle are fed on the refuse of the sugar mill and the manure applied to the land, would be twice in a five-year rotation, viz: on sward trench-plowed, to be followed with small grain, then corn with all the manure, then beets, to be followed by small grain and grass, half of the farm to be in grass all the time, which would give 32 acres each year devoted to the production of sugar.

The cultivation of root crops, which has added so many millions of dollars annually to the agricultural wealth of Great Britain, and enabled that country to support its millions of population, is not simply due to the actual money value of the crop produced, but to the enhanced value accruing to the land by the feeding of cattle, sheep and hogs thereon, thereby increasing the production of the cereals by more than double over former years, and it is humiliating to us, with our deep rich virgin soil, that we do not produce of wheat, oats, rye and grass one-half that produced per acre by the English cultivator, and the difference is principally owing to the introduction of root culture in that country, with its attendant necessity, deep plowing; and the time is certainly coming when we too must adopt some such system to renovate our already partially worn land, and it is to be hoped that we may soon be enabled to institute experiments here that will tend to elucidate the facts

connected with the renovation of our soils by drainage. Deep culture, rotation of crops, a knowledge of soils and their adaptability to certain crops, and the economical value of feeding carefully upon our farms the product of our soil. This very county of Champaign, which was formerly noted for its fine stock, is now dependent upon Texas and the Red river country for the steers she fattens. In order to keep up the fertility of our land we must engage more in mixed husbandry, and in order that our land may carry its full maximum of stock, we must come sooner or later to the raising of root crops, unless something shall be discovered hereafter which will take their place. I should consider it one of the most important and interesting experiments that this university could institute, not that I suppose that an experiment in any direction, instituted and carried out by any public institution, could be prosecuted as cheaply as by a private individual, on account of the fact that the minute record kept, and other obstacles attending any public undertaking, tends to enhance the cost thereof; nevertheless, the results arrived at are certain, and consequently carry weight with them.

I have compiled from various sources the following facts:

Indian corn or maize contains about 20 per cent. of water and woody fiber; wheat 30; barley 30; oats 36; rye 22 to 32; buckwheat 40; potatoes 79; turnips 90; carrots 88; mangle wurzle 87; the artichoke 86; the parsnip 86. According to another analysis the parsnip contains more water than the potato, and less than the beet and carrot, a larger per cent. of starch and dextrine, and less nitrogen than the beet and carrot. Experiments in feeding show, however, but little difference in their value for feeding, except in the case of carrots, which, by promoting digestion, thereby enhance the value of dry food.

A curious fact in the cultivation of roots is that stated by Mr. Stevens, embodied in the agricultural report of the Patent Office for 1847, that in the cultivation of Swedes, the drills 27 inches apart and the plants 12 inches in the row, an average weight of 8 pounds would give the enormous yield of 69 tons, 4 cwt., English, or 155,000 lbs—2,582 bushels per acre. Therefore, if we reduce the average weight per root of this crop 2 pounds, or would diminish the yield 645 bushels per acre, at 10 cents per bushel, it would pay the whole expense of cultivating and gathering the crop, hence we see the necessity in root culture of rich clean land and careful cultivation, and, in fact, a lesson may be learned thereby that will suit as well for many other crops. As regards the feeding of root crops, the flat white turnips should be fed first, then sugar beets, if any are raised, then ruta baga, and lastly mangle wurzel. These last may be kept good even to June or July, with care. I would not, from any remarks herein set forth, have it understood that I consider that the time has come for making the cultivation of root crops an economical or necessary part of Illinois agriculture at present, except in the case of small farms and village plats. The great drawback, however, is the scarcity of proper help for their cultivation at the right time; nevertheless, I do assert that, as the country is more densely settled, it will become more and more necessary, and that even now, near cities and villages, where help and manure is plenty, it may well become an important part of ordinary husbandry.

DISCUSSION.

Mr. Flagg—Speaking of the value of the root crop for food for stock. I would not wish to depreciate or undervalue this crop, especially as I am not familiar with it, but this I would like to say. It is my impression that in Southern Illinois, and in a great part of the West, we will find it more profitable and cheaper to grow apples than the root crops. I think that will be the case for many years to come. I would advise growing the sweet apple for food for stock. First, for the reason that the cultivation is comparatively easy, and, secondly, it is much less expensive to grow apples than root crops.

Mr. Periam—I would state that I do not consider the growing of root crops, in any country, of any money value so far as the crop itself is concerned, but it is chiefly on account of the condition in which these crops leave the land. I do not value the root crop except in this way. It has a prospective value. I do not know that the time has yet come when we can engage largely in growing root crops, but ultimately we shall find it of great importance, as is now the case in England.

Mr. Flagg—I would ask how the root crop thrives in our country as compared with this crop in England. Is not our climate too dry and hot?

Mr. Periam—The turnip is not easily raised here, but the beet will do well on ground in a high state of cultivation. In good soil, thoroughly pulverized, the beet will grow smoother. In soil recently manured you will probably have side roots. They will go where there is food for them. The greatest value of root crops is in fitting the ground to receive other crops.

Mr. H. Dunlap—I planted two ounces of beet seed and had beets enough to feed a milch cow for three months.

Mr. Robinson—Is it profitable to grow beets for sugar? and what per cent. of sugar is contained in beets?

Mr. Periam—I have not given attention enough to answer this question satisfactorily; I think, however, they will give 12 or 15 per cent. of sugar.

Mr. H. Dunlap—Mr. Emery, editor of the Prairie Farmer, visited a sugar factory in this State, and I think they stated to him that the beets contained 6 per cent. of sugar.

Mr. Periam—It is probably 12 or 15 per cent. of nutritious matter, made up of sugar, starch and other substances.

AGRICULTURAL BOOK-KEEPING.

A LECTURE BY CAPT. EDWARD SNYDER.

The subject on which I am about to speak certainly does not offer as many attractive or interesting features as many others. Perhaps the simple reason for it is that book-keeping is not a science, it is an art. That is to say, it is something to be done rather than to be known. It is one of those branches of knowledge that have been called into existence by necessity and fostered and improved by experience, following in their development and completion the exigencies of time and business.

It would be a vain endeavor for me to put before you in the short space of time allotted to me the history of its development, or a review of all the different systems of accounting that have been devised by men, or engage in a scientifical discrimination of their respective advantages, merits and faults. I must, by necessity, confine myself to presenting you a few general views and points, which I shall divide in two parts, the usefulness and bearing of strict accounting in common life, and its application to the administration of agricultural establishments of a farm. I propose in the outset to face one objection, and to reply to it, which is too often made against book-keeping, and that is the almost utter denial of its being of any use. There are a great many men, more than is generally thought, whose ideas on the subject might perhaps be expressed in the following words: "What is the use of all that scribbling and cyphering? Why, if I were to keep a hundred books, they could not increase my income one cent; if I would double the number, they could not decrease my expense by one-half cent. Let us have as little of that bore as possible. The only chief book which I take care of is the pocket-book; I grasp that tightly. I make what I can, I spend no more than I must. That's the way I keep books."

Well, it is true, books have never been devised to increase income, nor to decrease expense—we cannot change the past, even by the most careful record; it has been and is done. But for all that, those men are sadly mistaken. There is no man on earth who would not sit down some time and go over the history of his toil and his pleasures, of his earnings and spendings, for those words are synonymous. I repeat, those men are mistaken, they do keep accounts; the only difference is that they keep them in their heads, subject to all the mistakes of that faithless ally, memory, that refuses to serve us very often when we need it most; the difference is that they must try hard to guess where they ought to know.

The usual excuse for the neglect of accounting with these men is the work; there is too much writing to be done; entries to be made every day in some big books, and that is too much work after a day's labor. And then, as they said before, the game is not worth the powder. That is their reason, or, rather, that is the reason they give, for in truth there is another deeper reason lurking behind, which I will proceed to give for their benefit.

Men dislike to account for what they do. They have a perfect aversion against every *restriction, be it* even in the innocent form of a record of what

they are doing. And this is especially true in money matters; they don't want to be reminded always by a record that they have been using hard-earned money foolishly and uselessly; if it happened so, let it rather be covered by the veil of oblivion. That is the true reason, though a very poor one. Now men would never think of, or consent to, handling somebody else's money or funds without keeping accounts, without being able to satisfy that party and themselves as to the use they make of it, and how they succeed in persuading themselves that they and their own interests are second to everybody else, is one of those strange freaks of human nature that are difficult to comprehend.

Now, for the sake of illustration, let us take a man, any man, let us just reach out into the throng of the thousands and grasp the first we meet with. Let him be a mechanic, or follow any pursuit of life, and let us see whether or not it would pay that man to keep accounts. Let us suppose that man is not engaged in any speculative enterprizes, but simply works at something for a living, earns what he can, and tries to conform his expenses to his means. Well, some day or another he will sit down and review the state of his finances. He takes out his pocket-book—the only book which he keeps—and, after counting and recounting its contents, he puts it back into his pocket with a great deal of disappointment, and a vague idea is in his mind that there ought to be some more money there—somebody must have assisted in expending his money, for he never used all that. He is puzzled and out of sorts, and goes over to the grocer to settle his account. He asks for his bill and finds it almost double the amount he reasonably thought he might expect, comes very near accusing that gentleman of cheating: but in looking over the bill he finds every item correct; he adds the column, no mistake there, so he sighs and pays. On turning the corner his tailor meets him and very politely puts him in mind of a little debt of some twenty dollars, which he ought to have paid months ago, but had forgotten it. He hastens to apologize for his forgetfulness and foots the bill, but goes home in a vague fear that on the other corner somebody might make a charge on his purse in the shape of some long forgotten bill. He tries very hard to remember whether he owes other bills, is very angry with himself, forms a resolve to keep things in better order in the future, but generally that feeling subsides, and he goes the old round over and over again. Now, gentlemen, would it pay that man or not to keep accounts? Would it pay that man or not to know where his money goes?

Leaving the answer to you, I digress to present to you another aspect of the case. Suppose that man had, by some adverse accident, to reduce his expenses to a certain degree, to meet a diminished income, how would he be able to tell which of them are real necessities and which could be possibly avoided? He will be in the same dilemma as when he explored his pocket-book; he will fail in the attempt sure and certain.

The fact is but few men know what they really want for living, excluding all unnecessary expenses. It ought to be the duty of every man to ascertain that. It would arm him against every reverse of fortune, and if for no other reason this alone should be sufficient for every man—I admit no exception—

to keep account of his earnings and spendings. Success is the aim of life, of every business, but our success in life will be much affected by the intelligent use of our means, and our well being will almost chiefly depend on our ability to supply all our reasonable wants. Wealth in general, or money, is the means of procuring and satisfying all our material wants, and we cannot be too careful in handling that powerful element.

It is true, wealth is a relative quantity, every man carries his own standard of wealth within himself. One might be satisfied with a few thousands of dollars, another's desires might exceed a million, but I persist that if we succeed by strict account and control to ascertain the sum of our wants, we shall certainly be better able to work for the attainment of that aim.

Another thing deserves mention here, and that is the fact that in our present age many men incline to live beyond their income. The form of society, fashion, the multiplicity of wants which civilization naturally carries in its train, and the tendency of well living to gratify all the longings of a refined and cultivated mind and taste, may be the reason of it. Now I pretend that if anything can possibly check this tendency it is the keeping of accounts. I declare it incompatible with common sense to have, every time we foot the pages of our book, those silent witnesses of dissipation stand out in bold relief, and not to think of remedy. And the thought once conceived, half the work is done; plans to amend the deficiency will suggest themselves, action will follow the thought, and, if anything, that might cure.

Returning to the relation of book-keeping to life, I desire only to say that it has the same relations to practical life as every other and all the other sciences and arts in the broad field of human knowledge and experience. That is, it will become important just in proportion as it is found to be useful. Let us take any of the sciences to illustrate this theorem, for instance, chemistry. When at first, in the dark ages of the Mahometan conquests, taken up scientifically, men grasped the discovered principles with the full ardor of enthusiasm; leaving behind them the demands of practical life, they strayed off into the realms of speculation. Science, principles and theories were all, their connection with practical life nothing. They rose up to those sublime heights of science, wrapped in mysteries and clouds, and removed from the view and comprehension of common people. Chemistry was a mere pure science then, but did it enjoy the universal esteem, was it thought of so much importance as now? No, and deservedly not. It was only when it stooped down to our wants, when it went out into the field with the farmer, when it entered the workshop of the mechanic, in one word, when chemistry came to live among us, that we conceived its importance, just in proportion as we found it useful.

To-day it has entered our households; the time is near when our ladies will not be satisfied with the common fact that when they put cream in the churn and move the handle up and down the result will be a lump of butter; they will inquire into the reason, and I hope that the solution of such questions will afford them not only satisfaction and pleasure, but also benefit them. It is only when we admit an art or a science into our very household, when we

grow perfectly acquainted with it, that we can avail ourselves of its aid and judge of its practical value.

I have recently been reading an Essay on Economy, of a French author, who, in speaking of Holland, says that the ladies of that country are the most economical, the most intelligent economists he ever met. He ascribes this to the fact that the Holland ladies are required to keep formal accounts of their domestic expenses and receipts. That they make out yearly statements, showing what was spent in every department of the household, and that they take a great deal of pride in the accuracy and correctness of those accounts, exhibiting fully the judicious use they made of their funds. He quotes, as a singular coincidence, that the Kingdom of Holland has scarcely any national debt, a singular exception to the heavily indebted European countries. It is a strange coincidence we must admit, but there is a connection between those two facts, nevertheless. The financial affairs of the Kingdom of Holland are simply a reproduction and the sum of all its domestic affairs; the sense of order and economy, inculcated by their mothers, carried their effect into public life just as sure as the reverse would have done.

We might inquire here, what is economy? Is it the saving, the hoarding of the almighty dollar? Is it the stingy and miserly self-denial of life's enjoyments for the sake of accumulating wealth? No; it is just as far from the one as it is from the other; just as far from the spendthrift as it is from the miser. It is the right use, the intelligent use, of money or wealth. How many, how very many, men will take a five dollar note and spend it uselessly, satisfying the desire of the moment, gratifying one passing thought, without thinking that that amount represents the weary toil of nearly a week's hard work of the average of men. For what is money but the conventional mark of men and women's work? Gold and silver have not the power to satisfy any of our desires or wants—in their form a mere matter—nor has their substitute, the paper currency. Men and women's work is the only value on the face of the world. Everything is esteemed and valued by the amount of work that its production cost. If a barrel of flour cost $15, it is because it takes just as much work to produce it as there is work in $15.

But in order to arrive at the intelligent use of money, of that product of our toil and work, into our intellectual faculties, we must control that use, must call ourselves to account for every part of it which we employ to satisfy our desires and pleasures.

As soon as we step out into life and business, the importance of well regulated accounts becomes at once more prominent. A merchant can never think of being without correct accounts and books; it is forced upon him by necessity; it becomes there the very next thing after the business itself. It would be useless to recommend it to them, they know and appreciate its value. And still there are many, full too many, instances of indifference, incompetency and negligence, even among those men; but there the results are so striking that there are comparatively few that would not do their best to fill the bill, for we know by experience that in nine cases out of ten we can trace every failure in business, every bankruptcy, to that very source, to the deficiency of accounts, to which we ascribe many a ruin in common life.

The farmer is a trader; after buying a farm he is a merchant. His success depends partly on what he grows, most on what he sells and how he sells. If producing is the first condition, the selling is certainly the second condition, and the conforming with the demands of the market just as important for him as for the merchant. What has been said of the merchant is equally true of the farmer; no intelligent management of his business is conceivable without full and correct accounts, because the information to be derived from them is just as indispensable to him as it is to the merchant.

Here we must insert a definition of book-keeping. In most of the textbooks we find the following: "Book-keeping is the science of recording business transactions." This definition I believe, leaves out the main requirement of book-keeping. Why, the mere recording of a transaction would not satisfy any business man; a schoolboy could write down everything that happens in some form of a record, but that still would not be book-keeping. I say we must be able, from our books, to learn at any time the whole state of our business. We must keep, always ready, our records in such a form that we may be able to condense them without much work into one statement, where we can encompass at one glance all our affairs, and also their results.

There it is where many make so strange mistakes, and waste their work in the mere form of recording. I have often been told by parties, "Why I did keep books, and I have taken a great deal of pains to have them full correct, but somehow they failed to satisfy me—they did not show what I wanted." Where was the mistake? That man had certainly recorded everything that he thought worth knowing, perhaps too much of it. Well, he succeeded admirably—his work was a record and nothing more.

It is always so in nature: we must be disappointed if we expect from given causes more than their natural effects. Cash-book, day-book, ledger. We are driven here to the conclusion that in framing a system of books, we must steadily keep the end in view; we must clearly and fully ascertain what we want our books to show, then give our records the necessary subdivision and bearing; we thus avoid disappointment.

The question suggests itself here, "What do we want our books to show?" We might condense the answer in five points.

1. What we have.
2. What is owing to us.
3. What we owe.
4. What we have gained or lost.
5. How much we have.

Here we must mention the two great divisions in the various systems of book-keeping—by single and double entry. They are just what their names imply. The first records record every transaction once, as I might say in answer to the question "Where is it?"

The second is a more complicated system, whose origin we can trace back as far as the twelfth century, and which is said to have been hit upon in Venice, Italy. Its chief characteristic is that a twofold entry is made of every transaction, as if it be in answer to the two questions, "Where did it come from, and where did it go to?" Of the above given five requirements of a

set of books, single entry will fill the first three conditions, the fourth it will answer indirectly. In order to have them all correctly answered we must keep books by double entry. As I have demonstrated to you that the closing of books, the producing of a statement of our business, is the chief aim of books, I present to you herewith the close of a set of books of single and double entry. [Demonstrated.]

In the balance-sheet and loss and gain account of the double entry closings I have indicated the account which I think must be necessarily represented in a farmer's books. And here the reason comes in why agricultural books, by the very nature of the business, are more complicated than the books of the common merchant. It is because the farmer is something more than the merchant; he is also a manufacturer, and he must therefore adopt in his accounts part of the system used in manufacturing establishments—that is, the balancing of the cost of material and labor against the produce, or else his account will leave him in the dark about wherefrom and how his gain comes to him from this or that department.

If the farmer wants to know, not to guess, how much a bushel of wheat costs him, and consequently how much he makes on it, he must do exactly the same way. If he thinks it desirable to know the produce of his orchard, he must keep account of that part of his farm. He is free to make his choice between the two systems, let him select whichever he sees fit, but abide by the results; but never accuse the art of its incompetency of fully tracing all the phases of business, if rightly used. I will also put in here the remark, that though the double entry system might seem complicated it does not require much more work. The work of recording will be the same; it is only the place to be carried to, and the way of systematizing, that is the difference.

I am perfectly aware that I have not thrown all my remarks into the path of agricultural book-keeping and its form, but in taking you over the technical dry forms that have been devised, to intelligently discriminate between their merits and uses would have taken more time than I possibly could occupy, and I am afraid would have tired out the larger part of my audience. I hope and wish that some future day I shall be permitted to put before you systematically the arrangement and development of a full set of farm books, also to give you a synopsis of the so-called tabular system, which is used in the administration of the larger estates of Middle Europe, and shall be ever eager and willing to confer my mite to the advancement of the agricultural interest of our country. For if we cast one searching glance into the future of this country, we can easily discern that agriculture and the industrial arts will be the great basis of its development and grandeur. We never shall be a warfaring nation of conquerors. The very nature of our institutions, the form of our government, will protect us from that disaster. We hardly ever will be a people of traders; our seacoast may, but the great inland stretch of 4,000 miles from east to west, will be the emporium of agriculture—of agriculture in such perfection as the world never beheld before.

This reminds me of a quotation, which is ascribed to Franklin, where he says, "There are three ways for a nation to acquire wealth. The first is the

way as the Romans did of old, plunder the neighbors, and carry off what they have. This is robbery. The second is trade—but great profits in that direction naturally imply cheap buying and high selling, which has a tinge of cheating in it that we know by experience never proved beneficial to the character of a people. The third and the only honest way for a people to acquire wealth is agriculture and industry—we must grow and manufacture what we want, and so much more to exchange for the necessary products of other soils and climates."

America has indeed followed Franklin's opinion; she is under full headway to establish her grandeur on the broad honest basis of agriculture and industry.

ORCHARD FRUITS.

A LECTURE BY DR. E. S. HULL, OF ALTON, ILL.

ORIGIN OF ORCHARD FRUITS.

To grow orchard fruits you must have orchard trees, and to grow either or both successfully, requires a knowledge of the laws of vegetable growth. These laws are so complex as to require careful observation, much time and thought. It is not our purpose to enter into a full explanation of these laws, and yet reference to some of them will be necessary in order that we may know how to modify their effects on our trees and on our fruits.

All our trees bearing improved fruit have been brought to their present condition by reproduction from one or other of the wild or unimproved species to which they belong. If we carefully compare the wild or uncultivated tree with one of their descendants, we shall at once be struck with the change which has been effected. The wood, the leaves, the fruit, how changed! One is ready to ask, can it be possible that such large and luscious fruits as Howell or Beurre Bosc pears could have descended from the harsh fruits of the thorny trees indigenous to the European and Asiatic forests. The apple, too, which has been called the king of fruits, once existed only in thickets in the same countries with the pear, as a thorny, compact tree, whose fruit was small, and of a quality not better than the fruits of our native crabs. From these, and from similar beginnings, all our improved fruits were derived. This great change was produced in the simplest manner, viz: mainly by stimulating the growth. In this way an enlargement in the leaves, and a slight increase in the size of the wood cells, was effected. From trees thus wrought upon seeds sprang up; these in turn being subjected to similar treatment, in the next and succeeding generations were further removed from the wild type, until at length the small, compact and thorny branch has been turned to one much smoother and larger, the fruit of which is of the highest excellence.

How great the change is which has been effected, will best be understood when we state that among all the species of fruits which are now grown in our orchards, not one of them, when in their wild state, could at all compare in quality with our persimmon. But all this has not been done without to

some extent affecting the hardihood of the trees. The cells of both wood and fruit, the leaves, the branches and the pores, all are so enlarged in our improved trees as to retain only a semblance of the native stock from which they were derived. With the structural parts so enlarged comes countless blights and diseases, which have, in the course of a few years, spread to all parts of the land. To some of these diseases, also to the structural change which takes place in the amelioration of fruits, we shall again briefly refer.

NURSERY TREES.

Orders for nursery trees are generally given to nurserymen residing north of the place where the trees are to be planted. This is done under the impression that northern grown trees are hardier than trees grown at home or south. When or how this conclusion was arrived at we do not know; that it is erroneous we think may be shown. For example, if we examine trees grown far north, we find that their growth is often checked by frost at a time when the new cells, although perfectly formed, were yet soft. These soft cells resemble more those of succulent than hard wood plants. There will also be found to be present a large supply of unorganized materials for the formation of other cells which cannot be elaborated by the tree in its present condition; these young trees are therefore gorged with crude juices, which are greatly expanded by the severe frosts of winter; the new cells are burst, and the unorganized materials in the tree ferment and destroy the healthy parts with which they are in contact. On the other hand, trees grown very far south are, on the approach of winter, sometimes in a situation so similar to trees grown at the north, as to deserve a passing remark. Owing to the great length of the warm season, trees at the south often cast their leaves at midsummer, and after a short period of rest they make a second growth of leaves, which cannot be matured before they are killed by the frosts of winter. When this occurs, both the northern and southern trees are in the same condition; both are largely supplied with crude matter which they cannot mature, and hence the trees of both sections will be found to be too tender to withstand, uninjured, our mildest winters.

If the facts we have stated are borne in mind, they will afford a clue to the treatment trees should receive at the two extremes of latitude at which it may be desirable to grow them. For instance, a tree at the north should be so treated as to enable it to mature its growth some days or weeks earlier than they would do if cultivated as they commonly are. On the other hand, trees grown at the south should receive such culture as would prolong growth to as late a period as possible, and thereby avoid the summer rest and tendency to a second growth. If these conditions are secured, the trees of both sections will be as hardy as those which grow at an intermediate point, where they mature at the proper time without artificial aid.

SPONGIOLES OR ROOT HAIRS.

The removal of trees necessitates the loss of by far the larger part of their small fibrous roots, but not of spongioles, as is erroneously supposed, since, at

the time trees are at rest, their roots are destitute of spongioles. That this is so may be known by inspecting the roots in the spring. At this season of the year roots will be entirely destitute of spongioles, but as the period of growth arrives, from their sides, especially of the smaller roots, will appear many small warty excrescences. These excrescences are made up of a vast number of little bladder-like cells; each new cell, as it enlarges, divides into two, and each of these again divides and is added to those already made. In this way it is, by the multiplication of cells, that new roots, as well as other parts of trees, are formed. It is to the sides of these newly formed rootlets that the spongioles are attached. These spongioles, or root hairs as they are sometimes called, are not roots, nor do they ever become such, any more than leaves above ground become branches. The office of the spongioles appears to be to extract food from the earth needed by the tree in the season of growth; they act in concert with the leaves, and in the autumn they separate from the roots. Therefore, from the fall of the leaf until growth commences in the spring, all our deciduous trees may be said to be spongioless as well as leafless.

Shall we grow our trees with branches starting from the ground, or shall we prune; and to what height? These and similar questions are now often asked. We think it would be superfluous to give any instructions in growing fruit trees to low heads, since for the past sixteen or eighteen years all our journals, both horticultural and agricultural, have vied with each other in descriptions how best to accomplish, as they supposed, so desirable a result. Indeed so much has been written on this point that we have gone from trunks six to eight feet high down to those of as many inches. These low-headed orchards, on coming into bearing, have disappointed, or must soon disappoint, their owners. The conditions attending the growing fruits are now so changed from what they were but a few years since, that trees with low heads are in the main no longer a success.

They increase the labor of cultivation many fold. The low branches cut off the under circulation, inducing disease in the foliage and not in the fruit. They invite insect enemies, and make it difficult if not impracticable to arrest their ravages. In short, low heads are a failure, and the sooner we can induce people to start the heads of their trees at a proper height, the sooner will it be possible to successfully destroy insects, to ward off diseases, to insure color to the fruit, and make it practicable to cultivate quite up to the trees by means of horse power.

In planting an orchard we select trees according to their kind—apricot, peach, plums and cherries, one year old, from bud or graft; apples, and pears, two and three years old.

The four first named, if well grown, will be not less than five or six feet high, and will have many side or lateral shoots branching out horizontally from the main or vertical stem. In addition to the side branches, there will also be found numerous buds, extending from *the ground to the top of the tree.* Cut away all the branches and buds to the height of twelve or fifteen inches. Next cut away all the buds below the point at which it is intended the tree shall form its head, except six or eight buds, which are to be left at regular

intervals and on different sides of the stem. These last mentioned buds will push into as many branches *as there are buds*. It will be necessary to keep these side branches pinched back to ten or twelve inches during the summer, to prevent them from running off with the growth and robbing those buds and branches selected for the future head of the tree. Sometime after the fall of the leaves and before growth commences in the spring, reduce the side branches to one bud each, and when the branches from these buds shall extend to ten or twelve inches, pinch them as directed in the first year. The treatment will be the same the third year as we have directed for the second, except at the end of the season cut away all the side branches except those intended *to form the head of the tree*. The object of the side branches, of which mention has been made, was to strengthen the stem or trunk of the tree. Without them the trees would have become top-heavy and bent the trunks. Trees grown as we have described will have straight and tapering stems, which will be of sufficient strength in their fourth year to stand erect.

BUDS, GASSES STORED, ESCAPE OF GASSES, CAUSE OF DEATH, ETC.

To show the effects which frost, overbearing, and succulent growth have on the fruit buds of orchard trees, it will be necessary that we briefly describe those parts of the bud to which we shall refer. The buds of stone fruits of orchard trees may be separated into two classes. First, those which contain single germs of fruit, as the apricot and peach. Second, buds that inclose several germs, of which most varieties of the cherry are examples. Since the structure in both of these classes of buds differs only in so far that several of the latter are folded in one envelope, a description of one class will answer our purpose for both. The germ of all our stone fruits at first consists of a single cell, and this is situated in a small cavity, which, according to some botanists, consists of an embryo leaf, folded by the tree into a form much like a vase, but more tapering at the top; the sides or wall of the cavity thus formed is made up of numerous small cells. To appearance these cells are built up around the germ cell much as a mason would inclose a conical space with brick, with the ends pointing to the center. The cells at first are soft and readily press together so as to perfectly touch each other and make a close wall. The forms of these cells differ from wood cells in so far that the exterior and interior surfaces are not pressed upon by other similar cells, as in woody structure, and hence they appear, when viewed from either surface, to be of an oval form.

The parts of the bud we have described, and to which we shall refer, are covered with the corolla, which is the colored part of the flower, the calyx, which forms part of the envelope of the bud, and the scales, which inclose the whole.

Large and improved varieties of fruit we produced only on trees which have much larger wood cells, annual twigs and leaves, than seedling trees or those with small fruit. The buds of improved varieties are also large, and the scaly portions covering the interior parts of the bud are folded together more loosely than in smaller ones; so large and loose are some of these exte-

rior scaly coverings, as in the Melocoton family of peaches, that it frequently happens that moderate freezing of the buds, especially while they are wet, partly unfolds them, so as to admit of the escape of what is believed to be carbonic acid gas, which, so long as it remained, protected from frost the little wall of cells which inclosed the fruit germ, as in the peach. Gasses or fluids not only inclose and protect from the effects of frost the exterior wall of the cells that surround the germ cell, but the cavity in which the germ cell is inclosed is also filled with carbonic acid gas or other fluid, as has been ascertained by puncturing, and to which experiment we shall again refer.

Hence it never occurs that the germ cell, or the interior surface of the wall of cells surrounding it, can sustain injury until an opening is made in the wall by separating one from another the cells of which it is composed. But so soon as an opening is made the gasses or fluid escape and the germ is killed.

That the escape of gasses or fluids stored in fruit buds is destructive to them, as well as to the embryo leaves inclosed in the leaf buds, may be known by piercing the buds with a small broach not larger than a hair. If this is done in cold weather, the bud, whether it be leaf or fruit bud, is immediately killed by freezing; but if we perform the operation on a warm day, the bud will retain its vitality until frozen. If we delay, and puncture the bud after freezing weather is past, then the germ of either leaf or fruit will grow as though the puncture had not been made, except that in the leaf a small hole will appear, and the fruit will develop a scar at the wounded part.

It not unfrequently occurs that, very early in the spring, a small brown fly pierces the side of the wall of cells to obtain the sweet substance stored within. This it often does without preventing the growth of the germ.

In view of these facts it appears that the gasses or fluids are stored in the buds of trees only as a protection against frost. It will be asked, if the buds are protected against cold as we have stated, why the leaf buds are not killed at the same temperature that kills the fruit buds? The answer to this is, that the fruit buds have a larger share of nutriment stored in and around them, with which to commence growth, than is stored in leaf buds, and it is perhaps on that account that the fruit buds are most excited and are first to expand. But, most of all, the less power in the fruit bud to resist extremes is due to the premature separating of the calyx and scales covering the bud, induced by growth of the interior parts of the bud. This inside growth of the bud is due to the increase in size of the individual cells that surround the germ, and as these enlarge they expand the outside coverings of the bud, so as to make them more susceptible to moisture and ruptures by frost.

Therefore, the power of buds to resist cold is determined by the condition of the buds at the time the freezing occurs. For example, in the winter of 1856 and 1857, at Alton, the thermometer indicated 20 deg. below zero, and when carried a few feet away from the building it sank to 27 deg. below zero. Notwithstanding the severity of the cold, the Alton district was, the following summer, noted for its great yield of peaches. Our observations at the time went to show that the injury to the buds was only as one in eight.

Perhaps at this point we ought to explain the conditions combined to produce such favorable results. The trees having borne no fruit the summer preceding the winter to which we have referred, continued to grow until near the period of frost. There was, therefore, no premature swelling of the buds, as is quite common in the fall. The scales covering the interior parts of the buds were closely folded. Even the large and pointed buds of the Crawford's early and late varieties, which are classed among the tender peaches, were in a condition seldom seen at so late a period. The ends of the calyx and scales, which in these varieties usually appears to be partly open at the end of the bud, were so closely folded as to exclude moisture. In short, the buds were perfectly developed, and, up to the time of the severe freezing, had not frozen in the least, and were, on that account, in a condition to resist the lowest temperature possible for buds of the peach to endure.

Perhaps no injury sustained by fruit buds is more common than the bursting of a single cell in the wall inclosing the germ-cells. When hard freezing occurs, it sometimes happens that some of the cells pointing at the outer surface are ruptured; when this happens to only one cell, the exterior coating of the cell is held in place, and the fruit grows as though the injury had not occurred; except at these wounded places a scar will appear on the surface of the fruit. Also, in the early stages of growth, these wounded parts afford resting places, to which some of the cryptogamous plants attach and rot the fruit.

All our orchard fruits are more or less liable to this casualty, but most some varieties of pears; next, the English Morello, the Heart, and some of the Bigarreau cherries; peaches and plums somewhat less, and, as a rule, apples least. The germs of all fruits are most liable to injury in the way we have described the winter after they have produced heavy crops.

When two, three or more contiguous cells are burst, the fruit-germ generally perishes within a few hours or days, or, if the bud blooms and the fruit matures, the scar remains and arrests growth at the wounded part. When several ruptures occur, but on different sides of the wall surrounding the germ-cell, and the fruit matures, as is sometimes the case with some varieties of apples, then the fruit becomes knobby and of little value.

It not unfrequently occurs that fruit buds are changed to wood buds in the season of growth; this takes place only in trees, or parts of trees, that are making a very succulent growth.

All who are familiar with the practice of budding the peach will readily call to mind examples of this in stocks budded early in the season. If, under a microscope, we examine fruit buds taken from a tree of very succulent growth, we find in some the single cell or fruit-germ is wholly wanting; in other buds it is present, but the little wall of cells, of which we have previously spoken, is incomplete, one side being built up to the proper height, while in another part much is wanting, and in others the wall cells are so loosely placed as to suggest the possibility that many of the little cells had perished, leaving openings that remind one of a brick wall with many of its bricks pulled out.

This kind of defect in the buds of all our fruit trees is by far more common than is generally supposed, and often is induced by a cause directly the opposite of the one we have described, as will be known by an examination of buds grown on trees which have, the previous summer, produced an overcrop of fruit. A large proportion of buds on trees that have been overtasked are so like those of trees which make too succulent growth, that a description of one answers for both.

We well recollect the congratulations we once received of some fruit men, on viewing a vigorous peach orchard of ours in its fourth year, which was then full of bloom. We also remember how hard it was to make them understand, on account of the vigor of the trees, that, on the whole orchard, not a single peach would probably be produced.

Similar examples with the pear must be known to many now present. It is not uncommon for estimates of pear crops to be based on the fine display of fruit buds, and for the whole to prove abortive, from one of the two causes last named, but especially to the latter, and not to imperfect fetilization, as is generally thought. All, doubtless, are familiar with the fact that certain free growing varieties of apples, as Northern Spy, Yellow Bellfleur and others, on rich land, are many years barren of fruit; the trees bloom but the germs are defective by reason of the wood growth carrying away the nourishment needed to perfect the fruit-germs. The tendency of some varieties of fruit trees to produce overcrops one year and to pass through the following or alternate years without fruit, is well known. The varieties of fruit that are complained of are those only in which the tendency to wood growth is early completed, and at a time when both the roots and the leaves are active in elaborating plant food.

In some varieties all the food collected by the trees seems naturally to go to the formation of woody growth; in others it seems just as natural for the wood growth to cease in time for a portion of the leaf buds to change to fruit buds. When the terminal buds on the current year's shoots show themselves early, then the leaves continue active in the production of plant food, which is stored in all parts of the tree; buds which before were only leaf buds are changed to fruit buds. Sometimes a large proportion of the leaf buds are so changed, and so large an amount of nourishment stored that a tree has been known, the following spring, without the action of the roots, to produce leaves and a full crop of fruit to more than half their natural size.

We have experimented with apricot trees by keeping their roots frozen so late in the spring that many of their leaves were fully grown, and the fruit had acquired more than half its natural size. Similar examples might be cited. For instance, grapevines have been planted in open borders and afterwards passed through the walls to the inside of a conservatory in which fires were kept up. Such vines have produced both leaves and fruit of considerable size, while the border, in which the roots were, was yet frozen.

It is wholly within our means to prevent overbearing or barrenness in trees. And he who is ambitious to grow fruit of first quality, or to the most profit, should thoroughly understand the peculiar habits of each variety and

the method by which both barren or alternate year bearers may be made to yield a full annual crop of fruit.

To understand this we must refer to the trees active in growth. Trees which expend all their forces in the production of wood growth can produce little or no fruit. Indeed, it is not possible for any tree to perfect a fruit-germ and not again in some way disorganize it, unless the wood growth shall cease in time for the leaves to elaborate food enough to grow both leaf and fruit the following year, or until a part of the leaves shall attain to nearly or quite their full size. That this is so will be apparent when we consider that the leaves, which first appear in the spring, were formed in the buds the previous year, perfect in all their parts, and in the embryo state contained each individual cell found in them when fully grown. But we are asked, if there is no addition to the number of cells, how do the leaves grow? The answer is, that the only difference we can see between an embryo leaf and one full grown is in the size of the leaf cells. As growth begins in the spring, these small cells, which were formed in the previous year, begin to expand. Each individual cell thus enlarges until the whole of the numerous cells of which the leaves are composed are of full size.

To further illustrate this, let us suppose in a brick wall that each brick at the same time was gradually to expand several hundred times its present diameter, and you have just what takes place in the growth of an embryo leaf. Here we find the tree in possession of a full grown leaf. This leaf did not form itself, but was formed by the tree in the preceding year. To produce and sustain this cellular enlargement there had been stored the previous year a large share of nutriment in the buds and in other parts of the tree; this nutriment or plant food must not only be sufficient to feed the embryo leaves, but must also be sufficient to produce the small warty excrescences, the rootlets and spongioles. These new leaves and spongioles are the tree's laboratory. And those leaves and spongioles first grown were made, with the exception of moisture, wholly out of the materials that were stored by the tree during the growth of the previous year. When these vegetable stores are in sufficient supply to do this, and nourish the fruit-germs also, then we shall hear little about imperfect fertilization. On the other hand, had the food been consumed the previous year by ripening an overcrop of fruit, or by making a very succulent growth, then the tree would not store a sufficient amount of plant food to perform its threefold office in the production of leaves, roots, with their spongioles, and fruit. In this condition a part of the leaf, and the larger part or all of the fruit buds, yield up their nourishment, which goes to the production of root and leaf growth. The tree, therefore, is barren of fruit for the summer, its whole growth being required to recuperate the vigor of the tree. Such trees often bloom freely and cast their bloom. When this occurs uninformed persons often attribute this to want of fertilization, or suppose that the rains have washed away the pollen, and the like.

Having thus hastily referred to some of the causes of our fruit production and wood growth, we will now return and state, first, how we treat trees bearing alternate crops, and second, how to bring unproductive trees into

fruit. First, then, alternate bearing trees are such for the reason we have endeavored to explain, viz: exhaustion. What we have to do, then, is to economize and equalize the forces of the tree. If it be a Heart or Bigarreau cherry on which we are to operate, our first duty will be an inspection of the buds, that we may know what proportion of them is perfect. But before we proceed we will have to state that the fruit buds on most cherries are produced on little spurs, as they are called; these are two, three and four years in forming. Each of these will likely have five, ten or more fruit buds, and each bud will contain several fruit-germs. When all the germs were perfect, we have known as many as sixty fruits produced from a single spur, when not more than a dozen or fifteen could be properly grown.

Understanding as we now do the position of the buds on the cherry tree, we next determine their condition by an inspection of them, as detailed in our remarks on buds. Probably we shall agree, for a tree of which the diameter of the trunk is four inches, one-half bushel of fruit may be reasonably looked for, and for each additional inch in diameter four quarts may be added. Now let us further agree on the number of cherries required to fill a half bushel. As our way will double and perhaps triple the size of the leaves, the fruit will be correspondingly large. Hence we reduce the usual number five thousand to eighteen hundred, to fill the measure. Next, we estimate our buds, so many to each spur—five will be about right. Now each of these buds ought to yield three cherries, fifteen to each spur; we shall need, then, only one hundred and twenty such spurs, but we will allow a few, and say one hundred and thirty, to provide the required amount. This determined, some time before the buds open in the spring we prune away all the spurs except the requisite number, leaving those that are to remain evenly distributed throughout the tree. In addition to the spurs already formed there will be a great number of small one year old spurs developing for fruit for the next and succeeding years. Each year thin these out, always leaving as many again as you ultimately expect to reserve for fruit bearing, as some of them, under the treatment we have described, are pretty sure to run off into wood growth. Alternate bearing trees managed in this way cannot overbear one year, and hence will not require a whole year's rest in which to restore their exhausted energies, as would be the case had the trees received the ordinary treatment.

We now come to the second class, or trees of great vigor of growth that show but little or no fruit, of which, among cherries, Napoleon Bigarreau is a good example. For a long time both cherry and pear blooms greatly puzzled us. It was easy to know that no tree could bear fruit without bloom, but it was not so easy to assign a scientific cause why vigorous trees, in full bloom, should produce none. But after repeated microscopic examinations of fruit-germs taken from trees that had made luxuriant growth, we determined the cause to be due solely to imperfect organization of the fruit-germs, superinduced by want of nourishment. This, then, we suppose to be the condition of a barren cherry tree which we now propose to bring into full bearing. Trees that show great vigor of growth produce a great excess of large and small branches. We will then first prune off this excess of growth so as

to fully expose what is left. Next, with a sharp spade, we open a trench as deep as the lateral roots penetrate, and quite around the tree, cutting off all the roots. We vary the operation according to the habit of the tree, so as to cut off what we estimate to be from one-third to two thirds of all the root growth. Having finished the operation of shortening the roots, we fill the trench and give thorough cultivation to near the end of the season.

Peaches and nectarines have sported into many varieties, and of each there are early and late. For instance, the Hale's Early peach, at Alton, ripens about July 28, and the Heath cling at least six weeks later. Why the long interval in the ripening of the two fruits? With our present knowledge we cannot explain further than state that, on trees of the same age and under similar treatment, early and late kinds all bloom at precisely the same time; or, if any variation as to time of blooming occurs, it will as often happen to one sort as the other. Therefore, the statement so often made, in the spring after severe frosts, that the buds of early peaches must be killed, has no force.

Another fact in relation to this fruit that we do not recollect to have seen noticed, is that all varieties, early, medium and late, grow alike at first, all at the same time reach the point at which the stoning or hardening of the pit commences; from this time, until the stoning process is perfected, the peach does not enlarge; therefore, the only difference in the time required to mature varieties must depend solely on the time required to harden the pits. There are yet other points to which we desire to direct attention. Varieties of both peaches and nectarines are divided into three separate classes, founded on certain characteristic markings on the leaves. First, varieties with globose glands; second, reniform glands; third, those whose leaves are deeply serrated without glands.

Glandless varieties are subject to mildew in the branches, in the leaves and in the fruit, in so marked a degree as of late to be wholly worthless. In selecting varieties to plant, this fact should not be lost sight of. Why it is that mildew most affects this class, in the way we have stated, is a point on which we earnestly desire light. Can any one tell us the office of the leaf glands?

Pruning the peach is probably not correctly performed by a dozen persons in the country. We have visited hundreds of orchards, west and east, in not one of which was there the least evidence that a correct theory had guided the hand in performing this important operation. It is singular what a hold false theories will take on the minds of men when disseminated by high authority; and perhaps none have worked more harm than those which relate to pruning the peach. We can no more teach this specialty on paper than we could anatomy.

Yet we can state some of the theories that must be recognized to insure complete success. First, and the most important of all, is a recognition of what we term true fruit leaves.*

* This term is arbitrary, but answers our purpose.

We have already mentioned that a certain portion of the leaves, as well as fruit, was made out of the food stored in the tree the previous year. We have often queried, when reading learned dissertations on pruning, if this fact was had in mind, or whether it had ever occurred to the authors that the leaves of later growth, as well as the fruit from the time of stoning, were grown by those leaves that wintered in the bud. Leaves do not create themselves, but are in the main made by other leaves; hence every facility should be given to these first leaves to perfect themselves without much competition of leaves of later growth. We have demonstrated by repeated experiments that the fruit on any twig or branch will correspond to the size of the first leaves. Hence our term fruit leaves. We now see the importance of large leaves, and our next step will be to secure them. This we do first by thinning out such large branches as should be removed; then cut back to some small branch or shoot which points in the right direction, those that are extending too far or are likely to become pendant under the weight of fruit. Having done this, we next estimate the capacity of the tree for fruit bearing. For a tree six or seven years old, six one-third bushel boxes will not be too many. To fill these we allow forty-eight peaches to the box. If we allow two peaches to each twig, we shall require two hundred and eighty-eight such twigs. Cut away all others, except where new branches are desired. Many of these small twigs, or last year's shoots, on which the fruit is borne, will often have from ten to twenty, or more, young peaches, leave these until they are as large as a hazel nut, then reduce from one to three to each branch according to strength.

Before we close our remarks on the peach we will refer to a new difficulty attending its cultivation, mention of which we do not recollect to have seen. As soon as peaches are as large as a pea, a snout-beetle makes a small round hole, reaching quite down to the pit, or into the kernel, on which it deposits an egg; this egg soon hatches, producing a small white larva. The fruit drops to the ground soon after the egg is hatched.

We have often noticed these small fallen fruits, without, until recently, understanding the cause. So small is the round puncture made, by means of which the pit is reached, that it escapes notice unless the downy substance covering the peach is removed. We believe that the operations of this insect do not extend beyond six or ten days. As soon as the fleshy parts of the peach thicken so they cannot reach the pit, their depredations wholly cease. Can it be that the mischief is done by the Plum Gouger, of Walsh, or has some one of the numerous nut-beetles left its legitimate calling for the more genial pursuits of horticulture?

APPLES.

Until within a few years the apple was grown almost without care. Of late, however, so numerous are its diseases and insect enemies, that in some districts its culture is no longer attended with success. And unless we combine our efforts against its insect enemies we must wholly abandon its culture, or be contented to feast on the few wormy and knotty specimens which reach maturity.

So rapid has been the increase of the plum curculio and the apple curculio that in some districts these two insects, or even the plum curculio alone, are in sufficient force to totally ruin the apple crop. Hereafter, so far as we can now see, no escape from the ravages of these insects need be looked for, except by united effort in their destruction. So numerous have curculios become in our own grounds and surroundings, that for the past two years our Janet apples have been destroyed, and other varieties made worthless, except for cider. In the future we shall have to bestow the same care in catching curculios on our apple that we do on our plum trees. Except in very early apples, the larvæ of the plum curculio do not perfect themselves, but the parts wounded by them furnish resting places for fungi, where it multiplies and spreads to all parts of the orchard. Horticulturists must recognize the fact that as we increase the production of any fruit, we at the same time increase its peculiar insects and diseases.

PLUMS.

Thus far we have devoted no remarks specially to the plum, nor would we further trespass on your time were it not probable that some varieties of this fruit may be grown to a profit in all parts of the State, doubtless, in many parts, with far less care than will hereafter have to be bestowed on the apple.

In this country the curculio has so long held undisputed dominion over the plum that a knowledge of the varieties of plums has passed out of mind. We shall therefore refer to some of the best, that those who desire to enter the field against the "little Turk" may have fruit in quantity and of a quality to reward them for their labors.

For a single variety, for family and for market, we place the Jefferson at the head of the list. Three best for family, to ripen in succession, add Washington and Coe's Golden Drop. Four best, add Smith's Orleans. Five best, add Imperial Gage. Columbia is a desirable sort to plant in apple, pear and peach orchards, on which to catch curculios. The curculios would be attracted to these trees when in fruit, where they might be caught. The Columbia plum generally discharges so much juice into the passage made by the larvæ of the plum curculio as to drown them. On this account it is that we recommend it as a protection to our orchards.

River's No. 1 is one of the earliest plums with which we are acquainted. It bears moderate crops annually.

Dominie Dull.—Since the prevalence of the peach rot this and the following were the only sorts that have wholly escaped rotting.

Ghiston's Early.—Tree grows slowly, very productive, quality good to very good.

Lombard.—Tree a moderate grower, alternate bearer, quality only good. We should have omitted the mention of this variety had not an impression obtained that it was curculio proof; perhaps no sort is more preferred by the curculio.

Diamond.—One of the most productive and showy plums, of first quality for cooking, but too harsh for the desert.

Reine Claude d'Bavay, McLaughlin and Red Gage are good plums for the table, and may also be grown, to a limited extent, for market.

DISCUSSION.

Mr. H. C. FREEMAN—Do I understand Dr. Hull to say that fruit buds may be changed into leaf buds?

Dr. HULL—Yes. A vigorous growing shoot has the power to push into a leaf, starving out the fruit-germ.

Mr. FREEMAN—The practical inference then is, that, in the operation of budding you need not be particular what kind of a bud you take.

Dr. WARDER—It is always safer to put in a leaf bud.

Mr. FREEMAN—Mr. Pullim, of Centralia, informs me that many of the buds seeming to be leaf buds are really developed into fruit buds. He says it is difficult to tell the difference until they blossom.

Mr. MINER—What is the proper time to trim the peach tree?

Dr. HULL—Any time after the fall of the leaf.

Mr. MINER—Can you trim safely when the tree is frozen?

Dr. HULL—You can prune any time in the winter. If the limbs are frozen you must take care not to bend them. It is the bending of the limbs when frozen that does the injury.

Mr. WRIGHT—I would like some information in regard to growing the peach tree. I find, in this portion of the country, we have no peach trees. They are generally destroyed by this worm at the root of the tree. I don't know what it is called. I have bought trees two years old infested with this white worm. It seems to me useless to try to grow peaches unless we can kill this worst enemy of the tree. I do not believe there is a tree within five miles of this place that is not injured by this grub.

Prof. STEWART—I remember a case where a woman scalded the tree at the roots, and she never before had such an abundant crop.

Mr. M. L. DUNLAP—I knew a similar case in the city of St. Louis; the party scalding the tree for the purpose of killing it, but the tree received the seeming harsh treatment kindly and bore an abundant crop.

Mr. N. J. COLMAN, of St. Louis—I have heard the story of pouring on the hot water, but I heard it as happening in South Carolina. [Laughter.] I know that Edward Bates knew it tried in South Carolina. I have known other parties to locate the story in Virginia. It is immaterial, however, where it is located. You

will hardly be able to make water too hot for the grub; the only way to get him out of the tree is to bore him out. Some mound up trees six or eight inches. That practice is quite extensive in Southern Illinois. But the remedy is as we have stated. He who would grow peaches must go for the borer with a sharp stick. I have an orchard of eight thousand trees, and depend on nothing else. I know that Dr. Hull advises planting the peach tree deep in the ground—from four to six inches. I do not know whether this answers the purpose or not.

Dr. Hull—It does.

Mr. Colman—Upon the subject of high or low trimming I will say I do not expect to see our prairie farmers adopt the high trimming system. I have seen a great many orchards in Missouri, and the best orchards I have seen are those with low tops. It is true you cannot get under them to cultivate, and it is not desirable to do so. I am inclined to think low heads the best, say three or four feet. That would be my plan, and the further north I went I would go correspondingly lower.

Dr. Hull—When I said that low heads were a failure I made the statement from careful observation. What are the facts in the case? Take the fruit district from Centralia to Cobden. These orchards are all failures! Their failure amounts to millions of dollars for that one district alone. Twenty-three years ago I planted trees with low heads, and I raised good fruit. By-and-by others began to plant orchards and to grow fruit and *curculios*. I discovered the danger just in time to save myself. I had constructed a curculio catcher, and I must from necessity get it under the trees, and for this purpose, among others, I began to change from low heads to high heads, and I think the result has justified my conclusions in recommending high heads. We should remember that the conditions of fruit growing are changed from what they were years ago, when some of us commenced in this business. We should look this fact in the face and shape our practice to meet the necessities of the time. It is a hopeless task for me to plant an orchard with low heads and expect to gather fruit from it.

Mr. M. L. Dunlap—About this peach grub. I find that he will not pay any attention to your patent remedies. He must be dug out. Smiley Shepherd told me that he tried planting tansy, which was recommended to keep out the borer, but he found the tansy

was worse than the grub! [Laughter.] The knife is the sure anu best remedy. This remedy, faithfully applied, will not fail. Try it. In regard to the codling moth, we can use Dr. Trimble's bands of hay or straw, placed around the trunk of the tree. Examine the band frequently and catch the worms.

Dr. Hull—I would like to hear Mr. Dunlap on the subject of high tops.

Mr. M. L. Dunlap—I differ as to the height of the tree in part. Or rather I would adopt a modified system, between the high and the low. The high winds on our prairie orchards are a serious obstacle to growing high headed trees. On the other hand, we must provide for catching the insects. I would say trim your tree to two feet in height, and then let the heading of the tree commence. This will give room to run the curculio catcher.

Dr. Hull—Many are deceived as to the presence of the curculio in their orchards. I have examined trees supposed to be exempt and found them in abundance. In my plum orchard I go through the ground about three times. The curculio does not fly at a temperature of 70 degrees, but does fly at a temperature of 80 degrees. It is almost impossible to protect an orchard in the vicinity of other orchards unless there is a systematic warfare waged against these insect enemies. But if my neighbors wont work I must work the harder. I cannot use the catcher to advantage under trees headed only two or three feet high, hence I trim higher.

Mr. Rice—At what time do you commence to catch the curculio?

Dr. Hull—From the first to the fifteenth of May.

Mr. Rice described an insect that had troubled his plums and peaches, said he had never seen anything like it before, and wished to know what it was.

Dr. Hull—It is probably the plum gougher, of Dr. Walsh. It attacks the fruit and lays its egg next to the pit of the peach.

Mr. Robinson recommended the practice of mounding up around the trees with hard clay, to prevent the peach borer from depositing its egg. He had known this practice prove beneficial.

Dr. Hull—My observation is that the peach borer lays its eggs six inches below the surface of the ground, and below the collar of the tree.

A voice—How many years since the borer first made his appearance?

Mr. Robinson—I saw them ten years ago.

Mr. Wright--It is the opinion of some that they made their appearance about the time Mr. Dunlap came to this country. [Laughter.] I look upon this as the most serious thing connected with peach growing. The remedy proposed for the grub is death in time to the tree. I had a few trees in my yard and had grubs in them. I went at them with a "sharp stick," and kept digging at the trees and killing grubs, and about the time I had succeeded in killing the grubs I had killed the peach trees. So it seems to me that if Mr. Dunlap's method of getting rid of the grub is the only remedy, I think we may as well cease to try to grow peaches. If you will tell me some method to kill the grub, I will insure a peach crop at least every other year.

Mr. Freeman—I wish to inquire in reference to the loss of the quince crop. I have attributed it to a beetle that destroys the blossom.

D. Hull—They fail simply because they are not fertilized.

Mr. Edwards—I am perfectly well satisfied that if success in the cultivation of fruits is to attend our efforts, we have got to work for it. I believe we have got to have good industrious Adams and Eves in the garden, to "keep it." It is high time that every one of us understood that "eternal vigilance" only will guard our fruits.

Mr. Edwards asked Mr. Dunlap to explain Dr. Trimble's method of catching the codling moth.

Mr. M. L. Dunlap—Dr. Trimble's method of catching this moth is to make a band of hay and bind it around the tree. The insect spins its cocoons under the band, where you can easily catch and destroy them.

Question—At what time do you bind this on the tree?

Answer—About the middle of May, and leave it on till the last of June.

Dr. Warder—I would say, put on in the spring and take off in the fall. I am more and more satisfied that we ought all to subscribe for the Entomologist, published in St. Louis, and edited by our much esteemed friends Dr. Walsh and C. V. Riley.

A Voice—Who is the agent?

Dr. Warder—I am. [Laughter.]

GRAPES.

A LECTURE BY HON. GEORGE HUSMANN, OF HERMANN, MO.

'The old has passed away, and all things have become new."

n these days of railroads, of telegraphs, and of machinery, when space l time are almost annulled, a great revolution is silently, quietly, but for .t reason, perhaps, all the more powerfully working its way through all sses of society, through every branch of industry, in the accoutrements of r, as well as in the graceful arts. Mankind travels with railroad speed in ›ught as well as in action; and in no country, perhaps, is this more true .n in ours. We are a fast people, perhaps too fast in some things; but it :haracteristic of the nation that we take hold of everything we undertake :h an energy which is really startling to other nations. Young America is iant, uncouth sometimes, perhaps, but with a vein of good common sense ınning through all he undertakes, and generally with a shrewd eye upon the ıighty dollar.

That this is eminently true of American Grape Culture I hope to demon-ate to you in the course of the following remarks.

Only short twenty years ago, Cincinnati and the banks of the Ohio river re almost the only location in the country at all noted for grape culture. beginnings had been made in other locations, they were not yet important ough to be worthy of universal notice. Now, the whole country, from the lantic to the Pacific, is alive to the importance of grape culture; and there hardly a locality, even at the extreme north, where some varieties of the ıpe are not now grown successfully. Then, only one variety was considered uable as a wine grape, the Catawba; now, we count them by hundreds, to ich every day still adds further. Then, about two hundred and fifty gal-s of wine to the acre was thought a large average yield; now, we are not sfied unless we average from six hundred to twelve hundred gallons, and crude attempts at wine making of those bygone days, and their products, ıld make but a sorry show by the side of our Cythiana, Norton's, Heber-ıt, Delaware and Taylor wines of to-day; wines with which we can safely llenge the choicest vintages of Portugal, France, Burgundy and Germany. :n, we were entirely dependent on the seasons in the produce of our vine-ds and the quality of our wines; now, the science of Gall, Petiot, Captal Frings has come to our aid, and we can count with mathematic certainty n having good wines always and in every season.

ıut it is not alone in the quantity and quality of our wines and grapes that have improved. We have also learned to grow them with much less labor. ead of laboriously and slowly trenching the soil with the spade to the th of two to three feet, and burying the genial surface soil beneath the soil; instead of reversing the order of nature, we have become convinced t the grape vine, the most sun loving of all plants, flourishes better if the is left in its natural position. Where formerly the slow work of trench-and reversing the soil cost from one hundred and fifty to two hundred

dollars per acre, we now take the plow and subsoil plow and prepare an acre in a day, at a cost of about twelve to fifteen dollars. When formerly the vines were trained to stakes in the old slovenly manner, which took an acre of timbered land to supply the stakes for an acre of vines, we now make our light wire trellis, with a post every twenty feet, with half the cost and half the labor in tieing and pruning. Formerly the vines were not summer pruned until long after blossoming, when they had become one tangled mass of shoots and tendrils, and the knife, and very often the sickle, was resorted to cut the Gordian knot, slashing and maiming the shoots, and denuding the fruit, thereby causing stagnation of sap, sun-scald, and nearly all the evils to which grapes are subject. Now, we have learned to summer prune with the thumb and finger, thereby only gently checking the undue exuberance of growth, leading it into its proper channels, and simplifying the whole course of management, so that every boy and girl of ordinary mental capacity can now do the work in their father's vineyard. And last, but by no means least, we are growing thousands of pounds of grapes now, where there was one grown twenty years ago. The noble grape, the healthiest and most luscious of God's fruits, is no longer the rich man's luxury, but is within the reach of all.

There is no laborer so poor but he can now grow or buy grapes for his wife and children, so that it has become a *universal* fruit. And what is more, where one gallon of wine was made twenty years ago, tens of thousands are made now, and we are on the road to become a temperate people. For, my friends, every wine maker among you is an apostle of temperance; and if you produce that most innocent, healthful and inspiriting of all stimulants, good pure wine, thereby supplanting those abominable poisonous compounds which are now palmed off on the public as brandy and whisky, you do more for the cause of true temperance than Gough and all the total abstinence lecturers in the country. Is it not an insult to a *free* nation to try and fetter it by Maine liquor laws, to try to force people to behave like decent beings, and to forbid them to become beasts!

Look at wine-growing districts of other countries. Wine is there the every day drink of the laboring classes, and yet drunkenness is of very rare occurrence. And then look at our country, look at England, Ireland, Scotland! What do you see? Pictures of misery and degradation everywhere; the image of God transformed into a hideous mockery, family ruin and strife, neglected children, deserted wives. And have so-called temperance laws proved efficient against this? Quite the reverse. Man is so constituted that he will have a hankering after forbidden fruit. Say to him "touch not," and many who would not perhaps have thought of it before, will now try to get a taste of it, find it sweet because it is forbidden, and indulge oftener. It is an insult to manhood, in this, the freest of all countries, to try and shackle the will of man by law. Punish disorderly conduct and drunkenness as severely as you please, treat the drunkard as what he is, a nuisance to society, but do not say to the sober, industrious laborer, "Thou shalt not refresh thyself with a glass of good wine when thy muscles relax from severe toil, when thy tongue is parched with thirst, because thy neighbor makes a beast of himself by drinking whisky and brandy to excess."

This, my friends, is the noblest mission of American Grape Culture. Let offer a glass of good light wine, at a low price, to every laborer in the .d, to cheer him on and invigorate him at his toil. He needs it more than rich epicure at his well spread board, with every luxury at his command. d we can do it. We can grow and make good drinkable wine at seventy- cents per gallon, and when it comes down to that, or even a dollar per lon, its consumption will increase to a degree which will astonish those o are now afraid that the thing will be overdone, and the market glutted. We do not need a single drop of European wine in this country; we can w all that is consumed here, and we can, and will, *export* American wines. have proved already, in these short twenty years, that we can produce es equal to the best of other countries. Where is the Burgundy equal to etter than our Cynthiana and Norton's? Where the Claret better than Creveling, Clinton and Concord? Where the Rhenish wine with which Delaware, Taylor, Hebermont and Cassady need fear comparison? And re is a better Sherry than our Rulander and Hermann? I have tasted es from all countries, at fabulous prices, but I predict to you here to-day, I wish you to make a note of it, that in twenty years more we will rival surpass them all.

merican Grape Culture is only in its infancy; the young giant is hardly ke, but he begins to see daylight, and when the child becomes a man he fill the land, and we will make wines so good and so cheap that we can ish the protective tariff and still drive foreign wines from the market h our native produce. May we all live to see that day.

But, my friends, these are only generalities. I have tried to show you that new era in American Grape Culture has commenced, that "the old has ed away, and all things have become new." But, myself a farmer, I speak armers, and I know that they are practical men. Generalities will not ce with them, they must be shown the why and wherefore, they want s to convince them. If, therefore, you wish information upon any point, uld rather it should come in the shape of questions from you and answers m me; and you can rest assured that the answers will be candid, straight ward and explicit, to the best of my ability. My knowledge is but limi- but while I do not pretend to be an authority, I acknowledge none, and e no secrets, for we all seek the truth, and should gladly impart what lit- knowledge we may have gained to our fellow laborers.

DISCUSSION.

Mr. Edwards—I wish to inquire of the lecturer if it is his nion that our clay subsoils should be underdrained?

Mr. Husmann—I would like to inquire if the subsoil is very acious?

Mr. Edwards—Not generally very tenacious.

Mr. Husmann—Does it hold water in any considerable degree?

Mr. Edwards—Not like hard pan. In wet seasons, however, it retains a considerable amount of water.

Mr. Husmann—I should think it would be necessary, and certainly desirable, that such soil should be drained. My experience leads me to think that all the varieties belonging to the class of grapes called Labrusca require a richer soil than the class Æstivalis. There are exceptions to this rule.

A voice—State the characteristics or types of the two classes.

Mr. Husmann—The Catawba, Concord and Hartford Prolific are types of the Labrusca class. The Æstivalis is the common summer grape in our woods. The Norton's Virginia, the Cynthiana, the Hebermont, are types of this class of grapes.

Question—Where do you class the Delaware?

Mr. Husmann—It comes in the class Æstivalis.

Question—Where do you place the Isabella?

Mr. Husmann—It is Labrusca.

Question—Where do you place the Hebermont?

Mr. Husmann—Æstivalis.

Mr. B. F. Johnson, of Champaign—We have, I believe, t kinds of wild grapes.

A voice—What are they good for?

Mr. Husmann—Not much, so far as we have tried them.

Mr. Campbell—At what distance would you plant the Concord?

Mr. Husmann—6 by 10.

Question—Do you protect the Norton's Virginia in winter?

Mr. Husmann—I do not.

Question—Is the Ive's Seedling as early as the Concord?

Mr. Husmann—I think so.

Question—What are the particular varieties that you would recommend for general planting?

Mr. Horsmann—I would plant the Norton, Cynthiana, Ma-tawy, Clinton, Hartford Prolific, and some of Rodger's Hybrids, say Numbers 1, 3, 4, 8, 9 and 22.

Question—What number is the Salem?

Mr. Husmann—No. 22.

In answer to a question, Mr. Husmann stated that many varieties of grapes had a tendency to overbear, and this favored disease, mildew, etc. The Delaware would do this until we trimmed it very short.

Mr. B. F. Johnson—What is the best aspect?

Mr. Husmann—We take a southern slope where we wish to grow grapes for the purpose of making the best wines.

Question—Is it not considered that the fruit that ripens under the sun of the first half of the day is better than that with the last half.

Mr. Husmann—We do not find it so.

Question—Do you renew your wood as often as possible?

Mr. Husmann—Yes, in the case of some varieties.

A voice—Will you give your system of pruning.

Mr. Husmann—We modify the system according to the variety.

It was suggested that he take the Concord, and show his method of training the grape. Mr. Husmann here went to the blackboard and demonstrated his method of pruning the Concord vine. He fruits this variety mainly upon the laterals. He explained the practice of summer pruning, first and second pinchings.

Mr. Jewett—When would you make this second pruning?

Mr. Husmann—Just as soon as the shoots become long enough in the summer. Indeed, I don't know that I have a great deal of system in pruning; I go to work and prune just as I please. With the Catawba, in particular, we practice the renewal system.

Mr. Campbell—What height do you make your trellisses?

Mr. Husmann—Five feet.

Mr. Campbell—Do you use wires?

Answer—Yes.

Quesiton—How many?

Mr. Husmann—Three.

Mr. Husmann said, in answer to a question, we change our treatment, as I have stated, with the variety we have to deal with. The Norton's Virginia fruits better upon old wood; so does the Taylor, and also the Clinton. We fruit these varieties on spurs.

Mr. N. J. Colman—What is the best variety to succeed the Concord?

Mr. Husmann—I think Rodger's No. 4 the best.

Mr. Campbell—Is it as hardy as the Concord?

Mr. Husmann—It is hardy enough for us.

Mr. B. F. Johnson—What is your soil? What its geological formation?

Mr. Husmann—It is a sandy clay subsoil, overlaid with a black loam, and underlaid with sandstone.

Question—Is it good grain land?

Answer—Yes.

Question—Do you manure your vineyard?

Answer—Very seldom.

Question—Are animal manures injurious?

Mr. Husmann—Good native soil is the best manure.

Question—Are bones good manure for grapes?

Mr. Husmann—They are, but we can't get enough of them.

Mr. Campbell—Do you plant anything in your vineyard?

Mr. Husmann—Sometimes we plant potatoes, but not too near the vine.

Mr. Campbell—Do you ever seed the ground down and leave it?

Mr. Husmann—No, sir.

Mr. Campbell—How late do you cultivate?

Mr. Husmann—I cultivate all through the spring and summer, late and early.

Mr. Campbell—With the one-horse cultivator?

Mr. Husmann—Formerly I used the cultivator, but now I use the single-horse plow.

Question—Do you not disturb the roots?

Mr. Husmann—I do not.

Question—Is it any injury if you do break the surface roots?

Mr. Husmann—I think it is not.

Question—Do you mulch?

Mr. Husmann—No, sir; it is better to stir the soil.

Mr. N. J. Colman—How deep do you plant your vines?

Mr. Husmann—I try to put my vines about ten inches below the surface. I do not wish to force my vines to go down.

Question—What grapes are best to preserve for winter use?

Mr. Husmann—We generally preserve them in a liquid form. [Laughter.]

A voice—Perhaps the gentleman means to ask what grapes will keep the longest.

Mr. Husmann—Yes, I understand the question.

Mr. N. J. Colman—Do you have to shoot the birds?

Mr. Husmann—We shoot some, now and then.

Mr. Colman—Do they damage your crop of grapes?

Mr. Husmann—Yes; they have damaged us a great deal this *season.*

QUESTION—I wish to ask if you have ever tried Fuller's system of training?

Mr. HUSMANN—Yes, I have tried it. It is a very pretty looking system put on paper. Paper is very patient, but the vine is not always so patient; it is sometimes positively obstinate. This is the difficulty in the system.

In regard to the quality of wines, Mr. Husmann stated: We distinguish between aroma and bouquet. Bouquet is the product of the action of the air upon the juices of the grape, or acids contained in the grape. One may have a great deal of aroma and very little of bouquet, and vice versa. If we gather our grapes early, when they contain a great deal of acid, we shall have more bouquet and less aroma. If we want bouquet we gather our grapes before they are fully ripe.

A VOICE—The Concord makes the best wine, with the addition of sugar, does it not?

Mr. HUSMANN—There is no accounting for taste. Some people prefer this and some prefer that. Grape growers in Germany have pure good wines, for the reason that they are careful to pick out all imperfect berries.

Mr. N. J. COLMAN—What quantity of water and sugar is used in the manufacture of wine?

Mr. HUSMANN—That depends upon how heavy the must is. Take the Catawba, that will weigh 85, we use two pounds sugar to one gallon of water.

QUESTION—Have we any grapes adapted to making raisins?

Mr. HUSMANN—I do not think we have a raisin grape.

Dr. WARDER—We have no raisin grape in this country. There are three classes of grapes—

1. The American grape, represented by the Fox grape, called the Pulp grape. Everybody knows it.
2. The Juice grape.
3. The Flesh grape.

This last class of grapes, the flesh grapes, is the only kind of grapes suitable for making raisins.

Mr. COLMAN—From what grapes do they make raisins?

Dr. WARDER—I do not know the names of the grapes. I suppose, however, they make raisins from the Malaga grape.

Mr. M. L. DUNLAP—They have at Alton a system of pruning the grape vine. I wish to call upon Dr. Hull to give us some information upon this subject.

Dr. Hull—The system is a very simple one. I wish to refer to the diagram on the blackboard, for illustration. This system of pruning was devised on recognizing the fact that particular leaves have certain functions to perform, and that these leaves are best adapted to bring the grape to perfection. Now what we have to do is to keep these leaves perfectly healthy, and not to admit of competition. Our plan gives us eight leaves. [Reference was made to the diagram, and minute description given.] The plan is to twist the cane around a stake, so as to throw all the buds outward, and when the laterals have pushed out at sufficient length they are pinched one leaf beyond the last bunch of grapes. A second pinching is made, when the vine is left to itself. About ten buds are left to each cane, and but one bearing cane to the vine. This twisting of the vine will cause the buds to burst evenly, and this keeping the leaves fully exposed, and not crowding them, will double their size and improve the size and quality of the fruit.

DR. WARDER'S LECTURE ON PROPAGATION.

Seeds and buds are the basis of propagation. The distinction between them has already been explained. We also propagate by other methods than by seed or bud. We propagate by layers, where a portion of the plant is brought in contact with the earth. We propagate by *stolons*. The strawberry is an example. Runners are thrown out, and the plants rapidly multiply. Plants produced by stolons will be like the parent plant. There may be occasional departures from this rule, but these are rare exceptions.

We have another means of propagating, and that is by suckers. These are simply shoots starting up from the roots of plants, as in the case of some varieties of the raspberry, which are to be separated from the parent plant. There is another method of propagating. I refer to propagation by *corms*. Take the strawberry plant—the woody portions of the plant—and you will find points of growth in it, so that the corm may be divided into as many divisions as there are points of growth.

Propagation by tubers is another method. Still another way is by root cuttings. These are analogous to propagation by suckers. The propagation by means of root cutting is a sort of artificial suckering.

At the present time we will take up the idea of propagation from seeds. This is the common method of propagating where mere stocks are wanted. We also use this method when we wish to get new varieties. You will remember that I told you upon a previous occasion that seeds were used to multiply the species, and the buds to multiply the individual variety. Now the first consideration respecting seeds is their vitality. There is a great difference in the degree of vitality in seeds. Some will retain for a long time

the vital principle, others very soon loose this vitality. It is stated, with a good degree of evidence, that the raspberry will retain its vitality for one hundred years.

As a rule, seeds upon separation from the pulp should be dried and kept perfectly dry. Take the apple or pear seed, if not kept dry and at a proper temperature, there appears a fungus growth among them, which destroys their vitality. As soon as fermentation takes place the life of the seed is gone Seeds, even when well dried, should not be put away in large bulk together. It is safe to put apple and pear seeds in sand,.and it is safer not to wet the sand until just before planting, and when wet they must be kept in such a temperature as not to germinate. Some freeze them. This will do, providing you keep them sufficiently cool till planting time.

It is best to plant in the spring. The chief reason is, we avoid the trespasses of little animals that destroy them. The seeds of the raspberry and strawberry are mashed out from the fruit, and as soon as dry rubbed with sand. Wash and dry them again, or sun at once. It is safer to sun in boxes. They may be made to germinate at once and fruit the next year. I have eaten strawberries in eleven months from the sowing. Currents and gooseberries treat in the same way.

Now we come to consider the seeds of the stone fruits—the cherry, peach, and plum. The cherry, being a small seed, is apt to become dry. The seeds of stone fruits are exposed to the frost of winter for the development of the germ, when they are planted in the usual way. Some plant the seeds directly in the place where they are to remain. Others, again, allow them to grow in a bed for a while and then take them up and plant as you would cabbage plants. This practice is adopted more especially in the case of plums and peaches. The same practice is pursued in planting timber. In the case of oaks, it is better that acorns be gathered in the fall and placed in a moist soil, favorable for germinating in the spring.

But we come back to the seed-bed. The seed-bed should be good soil, finely pulverized, when it is ready to receive the precious germs. But the depth to which you plant is important. We estimate that seeds planted twenty times deeper than the diameter of the seed will fail to vegetate. Seed should be planted at an average depth of from half an inch to two inches. That will be deep enough.

With regard to the time of planting. This will depend upon the condition of the soil. If we wish to avoid loss we had better plant in the fall. Still the majority of persons plant in the spring. Some question as how to plant these seeds, whether with a drill or otherwise. The speaker favored the use of the drill. The wheat drill could be used in planting many crops by stopping up every other drill, or such portion of them as may be required to give the needed space to the rows. But in whatever way the seed is dropped, it is desirable to have it properly covered. The method of some is to cover with the foot, a very simple and effectual method where the soil is sufficiently mellow. Another way is to take a rake and cover the seed, or it may be with a hoe. Any method that covers the seed with finely pulverized

soil from half an inch to two inches, according to the size of the seed, is effectual and satisfactory.

It takes some time for the seed to vegetate. This is especially so in cold ground. If there is sufficient moisture, there are certain weeds that will immediately spring up before the seed. These may be destroyed by brushing over the top of the soil with a rake, or other instrument, before the seed planted comes up. This can be done by horse-power, using a brush. We run the brush across the drills for the purpose of more effectually destroying the weeds just starting up. I think the use of the brush or harrow at this time very great economy of labor. [The process of the development of the seed was given in detail on the blackboard.]

Grains have but one seed lobe. But there is a large class of seeds, the bean for example, that has two lobes. You will observe this on breaking them open after soaking them in water. The germ of the seed lies between these lobes. One produces the root and the other the stem. The descending axis becomes the root and the ascending axis becomes the stem. The special function of these seed lobes is to furnish food for the embryo plant until it is sufficiently developed to draw its nourishment from the soil and atmosphere. They fill the office, for the time, of digesters. At any rate, by the addition of moisture, they are capable of developing the young plant, and sustaining it until it is able to take care of itself.

The next point for our consideration is the cultivation of these seed plants. The object of all cultivation is twofold. First, to stir the soil and put it in such a condition that it may receive moisture and air, and, secondly, to destroy all intruders, by which we mean weeds. Air and moisture are essential to the growth of plants, and these are best secured by the frequent stirring of the soil.

Question—Is it not possible to keep our seedlings growing too long, that is, too late in the season? Will it not be better to stop the cultivation and check the growth before late fall?

Answer—It is important that all wood growth should be mature before cold weather, otherwise our trees are liable to injury from frost. But seedling plants are seldom injured in this way.

It is desirable to take up seedling stocks in the fall and heal them in, or store away in the cellar for the winter. Even if the weather is not very severe, so as to destroy the plants, the character of the roots is such that the expansion of the ground by frosts tear the roots, and thus do serious injury. We do not believe that freezing will injure the plants providing they are not frozen in the air and thawed in the air. We wish to avoid this condition of things, and so take up the seedlings in the autumn and store in your cellar, if you have one; if you have not, bury them out of doors. It is very desirable, however, to have them where you can get at them. In taking them up they are bound in bundles, assorting them as to size. Our remarks have particular reference to apples and pears, but will also apply to plums, and even to cherries.

In growing peach seedlings the pits are either frozen or cracked, and planted out in rows, and given thorough cultivation. In the case of berries, the

fruit is mashed and the seeds washed out and planted in boxes, or seed-beds, filled with soil and sand. Grape seeds are planted, not for stocks, but for new varieties only. The seeds are taken from the grape and sowed at once, in the autumn.

If you desire new varieties it is best to take the fruit of the best kinds from which to propagate.

The lecture closed with some remarks on the subject of crossing and hybridizing.

Crossing is the bringing together different varieties of the same species.

Hybridizing is the bringing together of different species. The result is a mule, or, as it is called, a hybrid..

DISCUSSION.

Mr. M. L. Dunlap—You have heard from the Doctor how to propagate plants, and how necessary it is to pulverize the soil, and how necessary it is that the soil retain air and moisture, and the importance of stirring the soil to destroy the weeds, etc. Let us now make the application to agriculture. Suppose we plow a piece of land for potatoes. We will then harrow, plant, roll, and harrow again, and then let it lay there until the potatoes come through and the weeds make a start. You then apply horse-power to destroy the weeds and let in the air. This is all right. But would you not accomplish the same object with less labor if you had left your land rough until the weeds had started, and then taken your harrow and pulverized it? We think this will accomplish the same result. We have a fine soil, letting in the air, and all the weeds destroyed.

Mr. Ludlow—I wish to state that at one time I prepared an acre and a half of ground, and had it in fine condition. Having harrowed it I planted it to potatoes. I dropped the potatoes ten or twelve inches apart, run with my harrow through the center of the row, and threw the ground back upon the potatoes, and let it lay until the potatoes came through, when I again ran through with the harrow, and in the fall sold the potatoes for sixty dollars in the ground.

Mr. Parks—I wish to ask the Doctor, if it is a fair question, whether plants receive more substance or food from the earth than from the air? It is true that plants receive food from both the earth and the air. Scientific men, who have given this subject their attention, agree as to this, but there are a great many men who do not believe that plants receive food from the air, b

all comes from the ground, and that the plant depends upon the manurial qualities of the soil alone.

Dr. Warder—There is no doubt that a large portion of every plant comes from the atmosphere. The carbon of plants comes from the absorption of the leaves, taken from the air. Hydrogen is received from the moisture in the air, as well as from the water in the earth. No man can say that only a small portion of substance is received from the atmosphere. A large portion is received from this source—how large a portion we do not feel authorized to say. Still, the earth is essential to plants.

SMALL FRUITS.

A LECTURE BY SAMUEL EDWARDS, OF LA MOILLE, ILL.

Within the recollection of many who do not consider themselves old, the cultivation of an assortment of small fruits was confined almost exclusively to gardens of the wealthy, or for marketing in large cities.

Formerly the apple and other orchard fruits succeeded admirably in nearly all parts of the Northern States, with but little care and attention. There were few varieties of noxious insects injuring trees or fruit, and they so limited in numbers that their depredations were scarcely noticed. By importations from the old world, the rapid increase of them and our indigenous varieties of insect enemies, the cost and uncertainty of growing orchard fruits has been greatly increased.

In sections of our country originally covered with dense forests, their almost entire demolition has occasioned climatic changes so great as materially to lessen the products of orchards.

The small fruits being exempt from injury by the insect depredators of our orchards, and as most of them blossom so late as to run much less risk from damage by spring frosts, the ease with which they are protected from injury in winter by covering—maturing their luscious, health giving products at just the season of the year when most acceptable to the palate and beneficial to the system—there is abundant reason for rejoicing by those who love horticultural progress, as we see the general, rapidly increasing, attention being given to their culture. Many, with only a few rods of ground, now enjoy them in variety and abundance, and their numbers are yearly increasing. Those owning homesteads whose dimensions are counted in acres, should improve their borders and sides of fences by planting small fruits. On the south side of a fence fruits are hastened, on the north retarded, in ripening.

The strawberry, in its different varieties, is adapted to a great range of soils; most of them succeed finely on dry prairies, which produce fruit of better flavor, though not of as large size as are grown on the borders of a slough. Doubtless this deficiency could be remedied almost wholly by underdraining, deep culture, and special manures, though these have not, to my knowledge, had a thorough trial in our State. Where grown for market,

trench plowing, followed by the subsoil lifter, clean culture in hills, mulching for protection from the cold of winter and dirt in spring and summer, are more profitable than a less expensive course; yet the pioneer without capital will feel himself more than paid for his labor if he plants liberally of them on his ordinary prairie breaking, giving them no after culture except a slight mulching at the first beginning of severely cold weather, indicating that winter is near.

Where cultivation is to be done by hand, rows eighteen inches to two feet apart, plants a foot apart in the row. In field culture, rows three feet apart, plants a foot asunder. Use a line in planting, as the cultivation is much more easily done where rows are perfectly straight. A bit of twine, tied to mark each foot of the line, facilitates dropping plants at the right distance apart. We use a steel dibble for this kind of work, which opens a hole large enough to receive the roots well spread out, taking pains to press the dirt firmly about them.

Well rooted young plants only are suitable for setting. They should be taken up with a spade, being careful to retain the roots as much as possible, and to keep them from drying. Trim off any dead leaves, and shorten the roots to two and a half or three inches in length. Puddle roots of all plants and trees.

Early in spring, as the land is in good friable condition, as a general rule, is the time for planting.

Good success is sometimes had in planting until near the middle of May, also, if rather moist weather, just after the crop is gathered.

In one instance, an acre set in August made a good stand with me. Have had several serious and one complete failure of several acres planted at that time. Autumn planting is not successful here, except the weather is unusually wet, advice of those who wish to sell plants to the contrary notwithstanding.

Thorough, deep, clean culture is to be given the first season, taking care not to injure the roots to any considerable extent. For stirring the soil deeply, a half-inch bar of iron, pointed at the lower end, fastened in a plow beam with handles, is drawn by one horse as deeply as the ground has been previously plowed, doing the work better than any other implement known to me.

Runners are cut by hand with a hoe, or with a rolling coulter attached to a cultivator. Always bear in mind that it is much easier to stir the soil and kill weeds as they are starting than when they have attained the height of a few inches, besides the added benefit to the plants by two such workings, at less cost than one when too long delayed.

Some prefer to grow in what is styled the matted row system—planting in rows three and a half or four feet apart.

As the runners appear train them along the row, forming a mass of plants a foot or more in width.

In all cases it is absolutely necessary to mulch just before commencement of winter, covering the plants slightly with prairie hay, corn stalks, or similar material, which has no weed seed in it if possible. Straw is used

better article is convenient, but it is objectionable for the reason just stated. The mulching should be loosened up early in spring, when danger of severe freezing is over. It may remain until after the fruit is gathered, unless there is danger of so many weeds as to injure the crop, in which case it may be removed to alternate rows the latter part of April, in my latitude (41½ deg.), earlier at the south; give one good thorough working, remove the mulch to the rows cultivated, when balance is stirred. The work is finished by placing the mulching around the plants, protecting them in case of drouth, and the fruit from dirt.

After gathering the fruit cultivate between rows; if on the matted row system turn under a part of the plants, leaving a strip of them six inches wide. Draw a little earth around crown of plants, to receive the new roots, which put out above the old ones. Cut off tops of plants just above the crown, which causes the new roots to start at once.

The decaying mulch is, on our new soil, generally all the manuring required. In poor soils, annual dressing with compost, containing a liberal proportion of wood ashes, is recommended.

By permitting runners to occupy space between rows, the old plants can be turned under, after bearing three or four crops. With the successful cultivators of this vicinity, and other parts of the State, present, the discussion to follow these brief introductory notes must prove very valuable. The value of different varieties, in various soils and localities, is a subject of great interest. We all know the Wilson—there are some varieties of a finer flavor, and new candidates for public favor, in considerable numbers, are annually announced as being far superior to any now generally disseminated. Some of these have proved very highly remunerative—to the self-sacrificing philanthropists who distribute them; but most of us are contented to defer purchases until plants are sold at less than $1 each, or $10 per dozen—the customary rates.

The Raspberry is one of the most valuable fruits for drying and canning, by many deemed equal, and even superior, to the strawberry at time of gathering.

A deep rich loam, rather moist than dry, is adapted to best success in the culture of the hardy American varieties. Deep tillage is very essential in preparing for a plantation. The ground can be laid off for planting with a small plow, run shallow. Where land is cheap, and it is desirable to do most of the cultivating with a horse and cultivator, six feet apart each way is a proper distance. Potatoes, cabbages, or some other crop, can be grown in the spaces until the raspberries are of full size. With limited space, three feet by six is adopted generally, planting strawberries between the rows. Use only thrifty young plants, covering the crown a couple of inches. They may be set in the fall or early spring; if the former, a forkfull of manure should be placed over each one, removing it before the plant grows through its covering of earth in spring. In case the dirt appears to be liable to bake before the young shoot makes its appearance, the crust should be carefully loosened with a fork down to the roots. Thorough clean cultivation should be given. Latter part of August cut back to within a foot of the base. If

this is neglected they are seriously injured, and sometimes die outright, in consequence of bearing a full crop the next year. Each succeeding year shorten the main stock to four feet, leaving the branches about a foot long. By this mode they grow strong enough to need no staking, yield more fruit, and of larger size than if left to grow unpruned.

The old wood should be broken down, with any feeble young shoots; leave five or six of the best in the fall, and give a heavy mulching of some kind of coarse litter.

The foregoing remarks have reference to the tall growing American varieties, which are propagated by layering the tips, covering them with two inches of dirt in September.

The Miami, Doolittle and Purple Cane have been well tried and are desirable varieties of this class; plants are hardy, bearing abundant crops of fine fruit.

The varieties which sucker from the root can be planted more closely; three feet by five is a good distance, setting three plants six inches apart, in triangular form, for each hill. The preparation and culture is the same as for the taller growing varieties. Suffer five or six shoots to remain in each hill, treating any others that come up as weeds. Tips of shoots should be cut back one-third their length in the fall.

Brinckle's Orange, like many others of this class, is tender; in severe winters kills to the ground. Its very fine quality induces many to grow it, covering the canes with earth late in the fall. With one hand to bend down and keep them in place, while another covers them with a spade, a couple of hours suffices to secure enough to give an ordinary family a taste of them daily through the season of ripening. The Philadelphia is a very abundant bearer; fruit of only medium quality; believed to be hardy enough to endure our winters, generally. Plants of this class are increased by suckers and root cuttings.

The so-styled Everbearing varieties have not proved of sufficient value in my locality to make them desirable.

The Blackberry requires more space than the raspberry; six feet apart each way answers very well. They require shortening back late in summer, and thinning out of suckers, as recommended for the raspberry, and, for best results, very heavy mulching. Of late they are very often winter-killed in the northern part of the State. W. H Hausen, of Lee county, protects with corn fodder in winter, having the plants grown rather thickly, in hedge-row style, for greater convenience in covering.

Mr. Merritt, of Battle Creek, Michigan, has practiced laying down the canes in fall and covering with earth. The roots are laid bare at the base, with a fork to manage the tops; one man places his foot against the stock at surface of the ground, bending the root to bring tops down to required position, another man covering with spade.

Lawton, when fully ripe, is fine; more tender than our natives. Kittatinny and some others are said to be hardier. The general mode of propagation is by root cuttings.

The Currant and Gooseberry require treatment so similar throughout that their culture will be described in connection. A deep rich loam, rather moist than dry, is best adapted to them. Although, for a time, in rich soil, they give abundant crops of fruit when neglected, yet they are greatly improved in quality and quantity by liberal manuring, mulching heavily, or clean cultivation. The bush form is preferable, in our hot and dry climate, to growing them as trees. Late in summer, early autumn, or early in the spring, are proper times for planting cuttings. Wood of one year's growth is best, cut in lengths of eight to ten inches; set four-fifths their length in well prepared, rich soil, press dirt firmly at the lower end, filling in loosely at top.

If cuttings are not planted until spring, it is best to cut them before severe freezing, wintering in moist sand in cellar. They frequently form roots an inch or two long during the winter, and make much more growth than if left on the bushes till planting time. They must, in every case, be cut before growth begins.

Vigorous plants, one to three years old, or thrifty offsets, are suitable for setting in permanent plantations, four by six feet, good distances apart. Manure liberally each autumn, or cultivate clean but shallow early in the season, mulch heavily before very hot weather. When they are of full bearing size, shorten long shoots of the current year one-third their length each fall, remove feeble shoots and old mossy and decaying branches, thus keeping up young vigorous wood for bearing. Burn up all trimmings to destroy currant borer.

By planting in shade of buildings, fences or trees, or by covering with some inexpensive material, they may be retarded in ripening and retained on bushes, for use, several weeks.

Red Dutch, White Grape, Black Naples, Victoria and Long Bunched Holland, leave nothing particular to desire for variety of near thirty varieties of currants tested. Cherry and La Versaillaise are large—may be identical.

Downing's Seedling, Houghton's Seedling and American Seedling are good varieties of gooseberry. The large English varieties are so liable to mildew as to render them worthless.

The currant worm is very troublesome in Eastern States, and is kept off by dusting the foliage, when wet, with soot from wood ashes.

Cranberries have been tried to some extent. Have never known of their paying for cultivating in our State.

The barberry, from its extreme acidity, is not desirable for cultivation to any great extent; so far as noticed it does not seem to be nearly as productive as in the Eastern States.

Though we have once seen the Chicago market glutted with small fruits of some kinds, there is room all over our State, at our own doors, in most localities, for selling large quantities of fine fruits, at prices paying much better than ordinary farming. This was the case in Bureau county at the time alluded to, when it was better to leave it to rot than pick for Chicago, without taking into account what can be used at home—worth more than money. For more than twenty years I have found a home market for hundreds of bushels of small fruits.

Our Allwise Father made no mistake when He gave man the fruits of Eden for his food, nor has man, by his wisdom, found a diet more wholesome or acceptable.

Anticipating confidently the presence of a large number of thorough, practical cultivators of small fruits, believing that the time would be more profitably spent in discussion and hearing the results of their experience than in listening longer to one, my endeavor has been briefly to introduce the subject for the evening.

DISCUSSION.

Mr. RICHARDS—I would like to ask what the currant worm is like. I am troubled with a worm, but don't know that it is the currant worm.

Dr. WARDER—This worm is related to the caterpillar. It is voracious, and entirely strips the leaves of our currant bushes.

Mr. RICHARDS—The worm to which I refer is striped and strips off the leaves from the bushes.

Dr. WARDER—I think the gentleman has the currant worm. I would like to have Mr. Rice tell us how he grows his big crop of strawberries.

Mr. RICE—I do not grow them, they seem to grow themselves, and with no difficulty. I prepare the ground by trench plowing, fifteen inches deep. Set the plants out in rows, three feet apart and eighteen inches in the row, and keep them in rows. I think now I shall adopt the plan of keeping them in hills. I keep the runners cut off. In the fall, when the earth begins to freeze, I cover with hay. I gathered from four and a half acres 610 bushels of strawberries. This year I did not have as large a crop as last. The price of berries this year, however, has been, as a rule, greater than last year. I think it is one of the easiest crops to raise. I would as soon raise a crop of strawberries as a crop of corn, after the labor of setting is completed. I remove the hay in the spring from the top of the plants, and, using the fine prairie hay, I can go right in with the cultivator; this is why I prefer the fine hay to the coarse.

Mr. H. J. DUNLAP was called upon to give his experience in strawberry culture. He said: I do not know that I can say anything more to the point than has been said by my friend Mr. Rice. Plow deep, set good plants in well prepared soil, cultivate clean, keep the runners cut off, and you cannot fail to have a large crop of this fine berry.

Dr. Warder explained the philosophy of cutting off the runners. By cutting off the runners branches were added to the corm, increasing the number of buds, and consequently increasing the quantity and size of the fruit.

A voice—Tell us how long these plants will live and bear.

Dr. Warder—That will depend upon the manner of treatment, and upon the variety you have. Some varieties expend themselves very soon, or run out, as we term it. Indeed this is the case with all varieties when cultivation is neglected. Other varieties, with good treatment, will continue to bear for many years. It is best usually to renew the strawberry plantation every three or four years. It is less trouble than to cultivate or clean the old plantation. Some advise a new plantation every two years. I have seen strawberry beds four years old bear well. In New Jersey they do not practice this system or method of cutting the runners. They plant in rows, five feet apart, as early in the spring as they can, and cultivate occasionally with hoes. The runners are encouraged to grow until they fill the row, and sometimes become a mass of plants three feet wide. This is their condition in May, thirteen months after planting. Instead of the hoe they take the plow and turn a furrow over the path; this is all the cultivation it receives the second and third years. The bed is then shifted to that which was the path, the runners having previously taken root there, when the old bed is plowed up and becomes the path. In this way they renew their plantations and succeed in growing large crops.

Mr. H. Dunlap—How long will a plantation of Wilson's Albany remain good?

Dr. Warder—Till the third year, at least. We do not discard the Wilson's Albany, but we do not think it so good as some others.

Mr. Rice—I think the soil of New Jersey is different from ours, and that they may, perhaps, adopt the method spoken of, while in our soil it would not be best.

Dr. Warder—Some one must try the experiment and see if it will do on the prairies. I would like to see this continuous row system thoroughly tested among us.

Rev. Mr. Riley—I would ask about the dewberry. Whether it can be cultivated to advantage. I am informed that there is a gentleman on the Cincinnati and Louisville Railroad who is culti-

ting these plants and selling them through the country. It is desirable to know whether they are good for anything or not.

Mr. Edwards—I have been growing the dewberry for ten years and am now ruling them out. They are not worthy of cultivation.

Mr. Dunlap—I have attempted to raise the dewberry for ten years. I have had them in bloom, but have never succeeded in raising a berry. I will give twenty-five dollars to any party who will grow and send me one bushel of these berries.

Mr. H. Dunlap—I understand that the Wilson Blackberry is sometimes mistaken for the dewberry.

Dr. Warder—You might mistake them in the first year. The bush grows low, like the dewberry. Some think it is best to pinch the shoots of raspberries and blackberries before the ripening of the fruit, with a view of encouraging the growth of laterals, and not have, as otherwise we would have, long slender canes that could not support themselves. The result of shortening the canes at this time is to make a little tree—it is more like a tree than a bush.

Question—How many branches would you leave upon a single root?

Dr. Warder—One is better than two, and two are better than three. In the case of the blackberry, one is enough, in the raspberry, two. Every one of these will throw out shoots next year, covered with an enormous amount of fruit.

The Doctor recommended cutting back the canes in the growing season. He had taken a lesson from his old cow, that had broken into his raspberry patch and browsed them down to within one foot of the ground. He never had so heavy a crop as the spring following.

Mr. Rice—I would like to hear from Hiram Dunlap, who is a successful grower of small fruits.

Mr. H. J. Dunlap—I suppose the diagram on the blackboard will show better than anything I can say as to the proper course to pursue in training and pruning the raspberry. Some canes will run ten or twelve feet if left to themselves; but if you want any fruit you must, in the second year, cut them back to one foot from the ground. These will throw out laterals, which are also cut back to two or three inches from the main cane. The next year the plants throw up strong canes. I usually put in

stakes to the hill, to which the canes are tied. As soon as the fruit is taken off cut out the old stems. I do not know that this is necessary. The second year the raspberry patch should receive thorough cultivation, and, if expected to produce good berries, should not be neglected at any time. There is one drawback in growing raspberries. It is the borer that gets into them and destroys the cane.

Mr. LUDLOW—I would like to hear from Mr. Dunlap if, in setting out a new plantation, there is any choice in the plants?

Mr. H. J. DUNLAP—I have never seen any choice.

Mr. GALUSHA—Mr. Edwards speaks of special fertilizers. I have tried special manures, but not upon our common prairie soil. I have tried it, and to advantage, upon light sandy soil for raspberries and blackberries. I have used bone dust, superphosphate, plaster, etc., with good results upon certain soils. I do not know that it would be good for our prairie soil. Would be glad to know if any one has thoroughly tested it on our prairie land, and with what results.

Mr. RICE—Good corn ground is good enough for raspberries, without manure.

Mr. GALUSHA—If by good corn land you mean land that would produce one hundred bushels to the acre, I think it is good enough. [Laughter.]

Mr. EDWARDS—On poor soils manure is recommended.

Mr. GALUSHA—In regard to varieties, I think the Philadelphia is, among raspberries, what the Wilson's Albany is among strawberries. It stands at the head of the list for general cultivation. It bears enormous crops of berries. The fruit is not so rich as that of some others. The fact is we do not want, for family use, the richest varieties of raspberries. You can eat your fill of them.

Dr. MORSE—I have had three crops from the Philadelphia raspberry, and can corroborate what the gentleman who has just taken his seat has said. It bears enormous crops and is hardy. The quality is good enough. I have heard it stated that they are hard to pick. The reason is they turn red before they are ripe. When ripe they come from the stem easy enough.

Mr. BUBACH—That does not agree with my experience. I got my plants from Pardy.

Mr. PERIAM—What the strawberry most wants is deep plowing and thorough working of the soil.

Mr. Edwards—I believe we shall yet be able to grow blackberries from the seed that will be h ardy and that will give large crops of excellent berries.

He spoke of a seedling that he had that was promising well, and said that he would be glad to send some of the plants to this university for trial. He did not propose to sell any.

Dr. Warder—I would inquire about the Missouri Mammoth. What is the promise of this berry, about which we have heard so much?

Mr. Bubach—I have the plants, but no fruit.

Mr. Robinson—In regard to the Dorchester. I have examined it upon a neighbor's farm, who has now discarded it in favor of the Lawton.

Dr. Hull—I want to say a word about these strawberries. I have drawn upon the blackboard a figure representing the roots and top of the strawberry plant. Dr. Warder has explained the fact of runners made from the plants, and the practice of some in cutting them off. But he did not make the application exactly that I would have done. We have all heard of Mr. Knox's success in strawberry culture. What is the secret of his success, for example, with the Jucunda? It is simply this, he keeps the runners cut off and directs the forces of the plant to the development of the berries. Now the Wilson produces heavy crops, sometimes without all this care in cutting away the runners, for the reason that the Wilson does not so readily make runners. Hence I sometimes call it the lazy man's variety. The Longworth's Prolific will produce runners to the end of the season, the Wilson will not. We like sometimes to get big berries; we therefore cut away all the buds but two. We by this means force all the power of the plant into these two buds, and when the berries make their appearance we take away all but three or four of them, and these grow to an enormous size. I have sometimes practiced this.

Mr. Galusha—I wish to add my testimony to the value of the American Entomologist, published in St. Louis, by Dr. Walsh and Mr. Riley, to fruit growers, and to second Dr. Warder's efforts to enlarge its circulation.

Dr. Hull—May it not be valuable to the farmer as well?

Mr. Periam—It is as absolutely essential to the farmer as to the fruit grower.

Dr. Warder—We get, in the American Entomologist, ten dollars' *worth for one dollar.*

DISCUSSION ON CATTLE.

The lecturer appointed to talk on Cattle did not make his appearance. The following discussion was had upon the subject:

Dr. Morse—I have looked forward to the time for the lecture on cattle with much interest, perhaps with more interest than that of any other lecture in this course, and consequently I feel a great disappointment that the lecture has failed. I wish, in the few remarks that I shall make, only to say something that will draw out discussion on this subject.

I endeavored to show in my lecture last week that the cultivation of grass was very important. It is a crop too much neglected in the State of Illinois, in favor of grain growing. We endeavored to show that there was a downward tendency in this kind of farming. The remedy is a resort to grass growing. It is an old adage and has much of truth in it—"No grass, no cattle; no cattle, no manure; no manure, no crops." We certainly need, then, cattle, in order to convert grass into beef, butter and cheese, and also to convert grass into manure, that the fertility of the soil may be kept up, insuring good crops.

Now there may be, and we think there is, too little attention given to the care of cattle. Even where men keep stock, they are negligent and careless in their attention to them.

In many quarters there is carelessness on the subject of breeding. A farmer has twenty or thirty head of cattle, and gives no attention to the manner of breeding. The bulls used are such as come up by accident. A young animal has been, from neglect, allowed to grow up a bull, and this is the animal used for propagating his stock. This is all wrong, and the degeneracy of the stock will sooner or later show it to be wrong. Now we have established improved breeds of cattle, and we can propagate the good qualities of individual stock. We can propagate any qualities desired, even to that of color. If you have a bull of good stock, whose mother was a good milker, you will have good cows for milk. I would not take the scrub bull for nothing, when a good bull could be had for twenty dollars. I would consider it a disgrace to accept of the services of one of these animals. Every man should select his breed with reference to the object he has in view in growing stock.

Upon the deep prairie soil there is perhaps no breed of cattle equal to the Durham or short-horn, equal to any other for beef, certainly, but not perhaps equal to some others for work and other purposes. It should be borne in mind that they require a great deal of feed, and should be able to get that without having to run about for it. The color prefered is red and white. The Durham is a breed of cattle with which most of you are familiar.

Another breed of cattle is the Herefordshire, which makes a very superior beef. There are very few of this breed in the country, but from talk I have had with cattle dealers I find they appreciate the Herefordshire highly.

For beef cattle I consider the Devons the best. The Devons are a distinct race of cattle, and there are no cattle that are capable of begetting their own qualities with so much certainty as the Devons. If you put a Devon on scrub stock you will see the calf take the characteristics of the Devon. I have occasionally seen a little white about the back, but doubt whether it is the best mark of Devons. The only objection to this breed of cattle is that they are small. There are families of the Devons which give rich milk, but usually they are bred without reference to the qualities of good milkers, for beef and working cattle. There are no cattle equal to the Devon for working qualities. They have great strength and endurance in the yoke.

We mention in the next place the Ayershire, with which farmers are more or less familiar. These breeds of cattle mentioned are of English origin. If we had time, and you had patience, we could give you a little of the history of these breeds, which would be interesting to consider. The Ayershire is a Scotch breed of cattle. It is a milking breed, and has been bred for perhaps seventy-five years with a view to the production of milk.

Mr. M. L. Dunlap—Is it not a Dutch breed, improved in Scotland?

Dr. Morse—There are different views on that point. I cannot speak positively in the matter. The color is usually red and white, sometimes brown and white. The colors are distinctly marked. There is no intermixing of colors, always distinct. They are handsome colors. They give the largest quantity of milk—larger than any other breed we have. It is rich milk also, but not as rich as the Alderney gives. But in cheese-making, and where the object is to produce milk, I would use the Ayershire, or

a cross of the Ayershire on native stock. The Jersey or Alderney cattle are celebrated for their milding qualities. There is a little variation in some of these cattle. Their color is more varied than that of the Ayershire. They have also more bone.

The Jersey cattle are brown and white, sometimes almost black and white, others nearly all brown. Frequently they are red and white, and nearly always fawn-colored around the nose, eyes and legs. The milk produces the largest quantity of cream and butter. The Herefordshires give more milk, but not so rich in cream and butter, but equally rich in every other respect. When the milk of the Alderney cow is skimmed it is very poor. The milk of the Alderney is nearly all cream.

Another breed is the Holstein. There is no doubt the Holstein is valuable for milk. The color is black and white, distinctly marked, sometimes large spots of white and black. We speak of color, and especially in the milking breeds consider it of some importance.

There is one other breed that we will mention, that is the Galloway, or no-horned cattle. They are a hardy, healthy cattle, and make good beef.

Perhaps I have occupied sufficient time in this way, and I will now give way to others who may wish to talk or ask questions.

Mr. Cobb was called for. He said: I have not much experience with cattle. I can give you a few facts in regard to the breeding of cattle in a limited way. About the year 1862, I turned my attention to farming, and commenced with the means I had, on the plan of a mixed husbandry farm. I started with a few cattle and a little of everything. My first idea was to have good things of the kind, if it was but little. Being a new comer, my motions were observed by the neighbors, who said "there is Cobb, who is buying new things; he will soon lose momey." My reply was, "I have but little to lose, and I will run the risk," and so started out with the view of having good things. I went among the farmers and bought the best cows for from $25 to $35. I got a herd of twenty cows, and then I went down into Kentucky and bought a bull for $400. That was carrying out the idea of my neighbors, that "a fool and his money are soon parted." The result is, so far as the cattle are concerned, I have a very fine herd of cattle after the space of seven years.

In regard to the feeding qualities of cattle, this is my experience. In 45 days feeding, side by side, with meal, the graded stock increased 25 per cent. over all others, and then when sent to Chicago, they were sold in a separate class a cent per pound in advance of the others. This ought to convince any one that if he can afford to have anything he can afford to have a good thing. It is a thing I have been trying to impress upon our farmers in the case of hogs. I sent to Pennsylvania and got two pigs, that cost me $30—Chester Whites—notwithstanding Long John says the Chester White is no breed, only a white hog. I have sent to Chicago pigs that, at 14 months old, weighed 400 pounds. Besides, I find at home ready sale for my pigs for breeding purposes. So that my investment of thirty dollars has made money. We do not lose money when we buy good stock. The farmer who speculates in stock may fail, but the idea is, let the farmer know what he wants, then get the best, or at least that which is good; let him have a certain way of doing things, and then follow up his plan.

Dr. Morse—I think the gentleman has just hit the nail on the head. It does not pay to keep poor stock, and what is more, if you keep poor stock there is a downward tendency, the stock degenerates.

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Mr. Colman—Mr. President and gentlemen: I do not know that I can add anything to what has been already said, and very well said, by the gentlemen who have preceded me. I will give some of my experience with stock and answer Mr. Dunlap's question.

In raising cattle I think we should generally select that breed adapted to our locality. I have a large farm in Missouri. The farm being hilly I preferred the Devon, and consequently I procured the Devon. I am very much pleased with this breed for my locality. I would prefer, probably, on these prairies, the Durham. I find the Devons excellent for milk. I purchased a three-quarter Devon of the Hon. W. C. Flagg, of Alton. This cow

a cross of the Ayershire on native stock. The Jersey or Alderney cattle are celebrated for their milding qualities. There is a little variation in some of these cattle. Their color is more varied than that of the Ayershire. They have also more bone.

The Jersey cattle are brown and white, sometimes almost black and white, others nearly all brown. Frequently they are red and white, and nearly always fawn-colored around the nose, eyes and legs. The milk produces the largest quantity of cream and butter. The Herefordshires give more milk, but not so rich in cream and butter, but equally rich in every other respect. When the milk of the Alderney cow is skimmed it is very poor. The milk of the Alderney is nearly all cream.

Another breed is the Holstein. There is no doubt the Holstein is valuable for milk. The color is black and white, distinctly marked, sometimes large spots of white and black. We speak of color, and especially in the milking breeds consider it of some importance.

There is one other breed that we will mention, that is the Galloway, or no-horned cattle. They are a hardy, healthy cattle, and make good beef.

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raised one calf, and excells as a milker. One reason is, perhaps, I take good care of her, and give her the stuff that makes milk, and if farmers generally would take care to slop their cows they would get more milk and butter. You cannot expect a cow to give milk unless you give her something that makes milk. If you give the cow only prairie hay and corn, this does not produce the most milk. I have found bran best; corn meal and clover hay are good, together with bran.

The reason why the Eastern cows give more milk and make more butter is chiefly because of the better care and keeping that they have. They have better pastures, better and a greater variety of food, and that of the right kind and in the proper quantity. With them how to make the cows give milk is a study. It is becoming a science with them. They have large barns and give their stock protection. What is the shelter that our stock in the West get? It is, perhaps, the poor shelter that a fence will give. We can't expect cows to give milk treated in this way. We should give our cows comfortable quarters, and then they will give milk. I know farmers who have got five or six cows, and never have all the milk and butter they want. They do not feed the cows. They do not shelter them. I tell you, sir, a well supplied barn helps to make the breed. I tell you, also, that the corn crib, the hay and the bran, helps to make the milk.

In regard to breeds, I think very highly, as I have stated, of the Devon. I know there are different families of them. I think that which Mr. Flagg has is the best. I can recommend that breed. I have a bull of that breed, and I can see all through the country thereabout the great good that he has done, and the people are thankful to me that I brought him there. I do not think as much of the Hereford as Dr. Morse does, but we will find that if we will take care of our cows of any good stock, we will have good milkers. Feed and shelter kindly, and they will appreciate it. For milk, that is for dairy purposes, I suppose the Herefordshires are generally preferred.

Mr. Baldwin—I have been for many years raising cows for dairy and other purposes, and will state my experience. I would, for dairy purposes, take some animals from the various breeds. The secret of having better milkers East, I think, lies in this—they are bred in that direction. If, for example, you have a cow that is an excellent milker, a cow that gives milk up to the time

of breeding; you cross with any good stock, and you by this course obtain a good dairy cow. This is the answer to Mr. Dunlap's question. It will take, perhaps, years to reach the degree of success attained by our Eastern friends. But in a short time the qualities of our milkers may be improved very much. I think the Devons make the best working stock; they are also always good milkers.

Mr. PERIAM, in answer to a question, said that seven-eighths was considered full blood.

Mr. PARKS—I think the gentleman is certainly in a mistake as to what constitutes full blood. I never considered sixty-three-sixty-fourths full blood, although it is nearly so. I would not consider nine hundred and ninety-nine-one-thousandths full blood. There is one peculiarity of the Durham cattle—they have the habit of feeding better than other cattle. They will be hunting for food and eating all day, while the common cattle will hardly have energy to move from their places in search of food.

Mr. PERIAM—I do not want the impression to go abroad that I am mistaken in what is considered full blood. I say seven-eighths is regarded full blood. That is, it is good enough. I do not confound "full blood" with "thoroughbred." Full blood is good enough.

Mr. COBB—Full blood is not good enough. We must have the best that we can command all the time. I think that Mr. Periam thinks so.

Mr. PERIAM—What I did say, or what I mean to say, is that full blood is good enough for the many, the thoroughbred for the few. I am willing that the farmer who can't get the full blood shall have the half-blood, and from that go on improving all the time.

COL. N. J. COLMAN'S LECTURE ON THE HORSE.

Mr. President and gentlemen: I received an invitation from the Hon. W. C. Flagg, Corresponding Secretary of this Institution, to talk to you upon the subject of Horse. The word "talk" pleased me, and to this fact, perhaps, that I was requested only to *talk horse*, you are indebted for my presence at this time. I like that good old Anglo Saxon word *talk*. It reminds me of the times when the aboriginies of our country assembled around their fires and talked over the affairs of their tribes, and if our farmers would hold frequent councils and talk over the affairs in which they are interested, it

would be better for the pocket and better for the intelligence and morals of the community.

I am glad that the great State of Illinois has taken the lead in this matter of holding councils, where the farmers of the State may convene and talk over the matters that directly interest them. I shall, in the discussion of the subject assigned me, give you the results of my experience and observation in breeding horses, just as those who have preceded me have given you the results of their observation and experience in the various and particular pursuits that have most interested them.

Dr. Hull, for example, talks to you upon orchard fruits, and gives you his experience through a long life upon this subject. Mr. Husmann talks to you on the subject of grapes, and we all feel that we have profited by his experience in vine growing. This is just what we want, viz: the particular and individual experience of farmers in that branch of agriculture or farm work to which they have given chief attention.

Now, in regard to horses, they are certainly very useful animals, but let me inquire for what do we want horses? Farmers want horses to work upon the farm; they also raise them to sell, just as they raise cattle and sheep and hogs to sell. These are the purposes for which farmers grow this stock, first for their own use, and then to sell in the towns and cities.

I do not propose, gentleman, to give you a history of the horse, going back to the days of Pharaoh, and tracing the story of the horse all along down to this date. Nor do I propose to give you a history of the various breeds of horses. I propose to deal with the present, and take the horse as we find him.

Small horses are adapted to a hilly country, but are not suitable for the purposes of the farm, particularly on our rich fertile prairies. They cannot haul loads large enough, nor turn furrows deep enough. We want, on the farm, horses that we can use for all purposes.

The Percheron, or Norman horse, is a breed that is being largely imported into this country. It is a good breed for draft purposes. We have a horse in this country—we have them in Missouri, you have them in this State—a horse favoring the build of the Percheron. He can haul immense loads, but he is too big boned and too clumsy for other purposes. He is not adapted to riding. He is not a good buggy or carriage horse.

The farmer, as we have said, wants a horse good for all purposes. He wants a horse that can draw heavy loads; a horse that he can take from the plow and put in his carriage and take his family to church. He wants a horse also good in the saddle. Now, these large clumsy horses are not active enough for all purposes; they are admirable draft horses, but when you have said that you have said all. [The lecturer at this point introduced the Morgan horse, and showed a picture of him as given in the Prairie Farmer.] There is no beauty about him. He is not a horse that I think farmers should breed from, except it be for the single purpose of obtaining draft horses, and even then I would not advise in favor of the Morgan horse. I would say to farmers wanting a draft team, breed from the Percheron, or Norman, horse. I will tell you what I think farmers should raise. I am, on the horse, as

some others are on cattle, I want to get back to the thoroughbred race of horses. I know it is said that these horses are not large enough. I admit that all thoroughbreds are not large enough, but we have those large enough for any purpose. You have them in this great State of Illinois.

How large a horse do you want? About 16 hands high. I would say 15½ hands high is large enough. But some of these horses are 17 hands high There is Patona, 16½ hands high. Do farmers want a horse larger than that? The horse Bonny Scotland is full 16 hands high. Mr. J. C. Simpson has a thoroughbred over 16 hands high. We have at St. Louis (Derby) 16 hands high and over. The imported horse Lexington is full 16 hands high. Now if we can get a thoroughbred horse of sufficient size, what better do we want? For one I would not wish to go back of that for my type to breed from. I like the thoroughbreds. Here is muscular development. Here is life and spirit adapted for any purpose. If you want a saddle-horse, no where will you find one that will answer the purpose so well. If you want a draft team you can find it here. They are the most intelligent horses in the world. Treat them with kindness and they will appreciate and repay you well.

In regard to breeding horses. I say get a thoroughbred horse of good size, and then take your largest and best mares, and you will not fail to have good horses for the farm, and also good for the market. You can take them to St. Louis, Chicago, or New York, and get a big round price for them. It is a shame to use our finest specimens of thoroughbreds on the race course, when they could be used to such great advantage in breeding purposes. There is just as fine a chance for farmers here to go to raising horses, if they will give it the proper attention, as to raise cattle, sheep and hogs.

There is a prejudice against race horses, and perhaps I share somewhat in this prejudice. But allow me to say, it is the race course that has developed the qualities desired in a horse. We want to get *action* in a horse. We do not and would not get the action we ought to have, without proper training. But here we get the trotting action. Having one of these horses, you have a most profitable horse from which to breed. I own two stallions. You see I value the thoroughbreds, and I have found the raising of these horses profitable. I sold last year to Mr. Loomis, of Chicago, a horse for $4,000. You could not now buy that horse for $10,000.

Who can help being pleased with the appearance of a beautiful and well trained horse? God has made us to admire the beautiful in nature and art.

Well, I must say something to you about the race course. I do not wish to recommend my farmer friends, and especially my young friends, to waste their time at the race course, or to make trotting trainers of themselves. I believe that the influence of the race course is bad. I do not recommend the raising of horses for the purposes of the race course. The influence is not only bad, but tends directly to neglect of business.

Now in regard to racing at our fairs, and here I know I am treading upon the toes of some. But for the exhibition of horses at our fairs we could hardly sustain them. At St. Louis, at the State Fair last year, we took in $100,000 in eight days. If we had not offered large premiums for fine horses

we would not have taken in one-half of that amount. We have got to get money in this way in order to sustain the institution and make it a success. But really we do not, at our fairs, have racing in the legitimate sense of the term. The horses go round, and the one making the quickest time gets the premium, and if our Illinois friends would adopt this plan and allow the exhibition of speed (each horse trotting alone) they would succeed better. This is only my opinion.

Now a few words in regard to breeding. We should have a thoroughbred stallion, with trotting action. If you get one of this description he will impart himself, even to color, to the colts. Out of forty or fifty colts from a stallion owned by myself, only three have been of a different color. He has simply imparted himself.

I go, for color, largely on bay. I think it is best. I get a colt with fine trotting action. I do not expect to train them. I expect the rich merchants and bankers, and fast young men, will want just such a horse, and I expect to sell him to them.

There is another thing in regard to breeding. Those who keep stallions do not handle them properly. They pamper them and over feed them, do not give them proper exercise. Hence their offspring is not what it should be. Your horse should be in the highest state of health. In order to this, you must give him plenty of exercise, plenty of light, and plenty of air. He should be brought up to a fighting condition almost. Train him as they train a man for boxing. I tell you if you want your stallion to do credit to himself you must give him muscular development, a heart and lungs in perfect health and action, else he can't impart these to his offspring. This is one of the great secrets in good breeding.

I do not believe that a pampered and grossly kept bull is capable of giving the best results. It is not, however, so important in cattle, inasmuch as they are bred for the purpose of being slaughtered. But in the horse these things are of first importance, as he is bred for a very different purpose.

Now in regard to the kind of mares to breed from. Most farmers know what kind of stock they want in a mare. Large mares, or mares with large roomy abdomens, are best. The horse may be comparatively small if the mare is large, with good results. But if you breed a large stallion to a small mare, you may expect to have a wishawashy colt.

In a stallion you want strength and power in the least possible space. It is not so with the mare. She may be, and it is better she be, large and roomy.

You will find that you can work these mares in a moderate way. I have forty brood mares, and I can work them all I wish to do. It is better they be worked or exercised a little every day. After you have the colt the work should be very moderate.

Handle the mare and colt constantly, otherwise the colt may be wild as a deer, and will not be so easily controlled at breaking time. The mares should have comfortable stables and good care in all respects. Colts handled from the first are very easily broken. I have never known one that I could not handle. Perhaps I have got too much notoriety in St. Louis in this respect

In handling horses I treat them as animals with intelligence. I let them know that I am their friend, and treat them accordingly.

The horse can see better than you can; he can hear better than you can; he can smell and feel jnst as well as you can. In your treatment of them bear these facts in mind. You have all heard of the great success of Mr. Rarey in his horse taming power. I can take a horse as wild as a deer and soon have him under my control, and it is simply because I convince him that I am not going to hurt him, and that I am his friend. You have got to approach him by degrees. Let him smell of your whip. Get on his bridle. Get the bridle in your hand and you are his master, and in ten minutes you will find he will lie down completely your slave. It will require but a few lessons of this kind for him to know his place and obey your voice. I have broken hundreds of colts, a great many of which I have been able to put at once in the wagon and drive them with whip in hand.

It would be just as reasonable to take a child who had not learned his letters, and flog him because he could not read, as to take these colts and beat them into the harness. You should talk to the horse; he has intelligence that is good "horse sense," and knows when you speak kindly to him. When you want him to stop say "wo." Be patient with him till he gets used to the harness. Let him learn your language, your wishes, and you can do anything with him you desire. You can get him to do anything if you will only let him know what you want. You can get on him and ride him to death, when he could, if he would, dash you to death for such horrid abuse of a poor horse.

That is one of the great secrets in training a horse—let him know what you want. Talk to him just as you talk to your child, and treat him as kindly, and you will never have any trouble with him,

What a noble animal the horse is! And yet how frequently is he the subject of thoughtless and wicked abuse at the hands of his master, he has served so faithfully and so long. He is driven upon the road all day, with perhaps but little water, and upon half rations. He is taken home at night, all mud, and left in that condition, and still with hardly enough food to sustain nature.

I am here to-day to plead for the horse, and to ask for him kindlier treatment than this, noble animal that he is. On the other hand, a great many persons kill their horses by kindness. The stables are too close, too little light and air. The horse is an animal that has lungs; he consumes a great deal of oxygen. Go into the towns and you will find the horse confined in a close stall, almost forbidding him to lie down. The horse wants an abundance of air and light. One reason why we find so many horses diseased in the eyes is because they are confined in dark stables. Then let me urge the necessity of providing for an abundance of air and light in the construction of horse stables. Have windows for your horses eyes as well as for your own. Light is necessary for perfect health. We make a great mistake when we build dark stables.

There is another subject that should be mentioned, and with this I will close these remarks, which I have made with little or no previous reflection.

I refer to the importance of acquiring a knowledge, as far as possible, of *veterinary science.* Quack horse doctors are to be let alone with a vengeance. Wherever there is an intelligent veterinary surgeon it is best to consult him in all important cases. Students in agricultural colleges, and others who have to do with horses, ought to be taught this science.

I thank you for the kind attention you have given me in these rambling remarks. I said in the beginning that I came here only to *talk*, and now my talk is done.

DISCUSSION.

Prof. BAKER—I wish to inquire of Mr. Colman how he would proceed in the management of a balky horse?

Mr. COLMAN—I will give the gentleman a practical illustration of how I would proceed with a balky horse. [Laughter.]

Mr. M. L. DUNLAP—You might take the Professor for the subject of your illustration. [Laughter.]

Mr. COLMAN—I do not pursue Mr. Rarey's system of throwing horses. Some horses balk in one respect and others in another. I have a mare, once owned by Mr. Alexander, of St. Louis. He was offered $2,000 for her. Afterwards the negroes broke her and spoiled her. She became one of the worst of balky horses. Finally he sold her to me. I proceeded in the first place to get up a new dictionary—at least a set of new words and phrases. I then put the mare in my sulky with another animal by her side. I had a large and strong sulky. She would lead but would not drive, so I got a boy to ride this one and lead the mare, while I was behind in the sulky, using the new words. [Laughter.] We went to the city in this shape without much trouble. In going home the mare came to a stop and refused to proceed any further. I was now driving her without the boy. The mare stood there, and I let her stand. By-and-by, when she got tired standing, she made another start, and for a time all was well, when she made another stop, more stubborn to all appearance than ever. I did not fret her nor urge her forward, but let her stand. We staid there till nearly dark. I had made up my mind to stay there as long as the mare wished to stay. But as night came on the balky animal became as anxious to get home as I was, and needed but little urging to continue the journey. [Laughter.] She has not, from that day to this, given us any trouble, and is just as kind and gentle as any family horse need be. She took the premium last year at our fair, over many others.

Mr. White—What is a thoroughbred horse?

Mr. Colman—If the gentleman knows what thoroughbreds are, there is no difference between a thoroughbred horse and a thoroughbred bull. We trace all our thoroughbreds back to the English racehorse, and they take theirs back to the Arabian. There is a great difference between thoroughbred animals. I would give a hundred times more for some animals than for others. Old Boston never had his equal; and so with Lexington, and perhaps we may say the same of Red Eye.

Mr. Burrows—Let me ask Mr. Colman if there is not a thoroughbred draft horse? You have spoken only of speed horses.

Mr. Colman—It is not so regarded. None but race horses are considered thoroughbred.

Mr. Burrows—The lecturer, in speaking of crossing horses, said that if we crossed a large stallion with a small mare we got a wishawashy horse. That I believe to be a good principle in certain classes of stock. But can we cross in that way for training stock if we are to get that which is good for nothing?

Mr. Colman—I regret that the gentleman was not in to hear what I said on that subject. This is the very position that I take. The point of my talk was that we should have, as farmers, horses good for all purposes, and if with this we can get the trotting action, so much the better. The farmer does not want to train horses, but he does want horses combining all good qualities. My friend is very far wrong in supposing that thoroughbred has any reference to draft horses.

Mr. Rice—Are "thoroughbred" and "full blood" terms signifying the same thing?

Mr. Colman—Not at all, sir.

Mr. Woods—As I understand the term thoroughbred, it is a specific term, and not generic. If you make it a generic term, then you may speak of thoroughbred draft horses, but as a specific term you cannot.

DR. WARDER'S LECTURE ON THE GRAPE VINE.

THE GROWING VINE.

The lecturer considered first the growing vine. In the growing vine there is commenced an extension of growth called a "shoot." The shoot is at first soft and sappy, not having yet deposited any fibrous matter. As growth advances woody matter is deposited and we have the strong canes of the vine.

We notice that the shoots are made up of joints, or, as they are called in botany, "nodes." The space between the nodes or joints is called the "internodes." The leaf is always started at the nodes. At the axils of the leaves there are buds, which, in a beautiful development, expand themselves into other shoots called laterals. Just as soon as they shoot out another bud appears, and just here is a curious and interesting arrangement. The bud appears first upon the right side, for example, and then upon the left—right and left all the time, this arrangement always remains. [This was illustrated by exhibiting a vine and verifying the fact stated.]

These lateral shoots can be easily controlled at an early period. At the end of the season, when the leaves drop, the name of the shoot is changed, and we call it a cane.

It is important that we get a proper understanding of these terms, in order that we may know what we are talking about. The cane is that portion of the grape vine from which new growth emanates, and upon which fruit is produced. It is the only wood upon the vine that can produce fruit. It is the growth of the season just past, and if we want fruit another year we must save of this wood. Take these canes away and your vine is barren. The cane is the ripened shoot. The stem is the harder and older portion of the vine and is covered with two layers of bark.

PRUNING THE VINE.

The manner or style of pruning and training the vine will depend upon the object sought in pruning, whether we wish to cover a trellis or train to stakes.

The first thing to do is to plant the young vine in the vineyard, the soil having been properly prepared to receive it. The first season it will produce one or more shoots. We then prune the vine so that every leaf and every bud shall do its full duty. The duties of the leaves are to evaporate and assimilate the juices of the vine. In other words, the leaves effect the evaporation needed to aid the circulation and assimilation and form the buds.

Now what are the duties of the buds? They are, as it were, centers of vitality, and by retroaction form the wood fibers and the roots, and establish their own individual existence.

How can we best secure these results? We remark in the first place, we should train the vine upright. If there are too many shoots, pinch out some of them, and check others at the proper time, only do not extend the pruning into the summer, except it be to concentrate the forces of the vine by very moderate pinching. In the fall or winter the growth of the vine, one year set, is cut back to two or three eyes, and if at the end of the second year the growth has not been such as to warrant fruiting, it is again cut back to two or three eyes. When the vine has attained sufficient strength and maturity for fruiting the vines should be trained on stakes or trellises, in a way to secure the best results—that is, in a way to expose them as much as possible to the light and air. The amount or shortness of the trimming should be in proportion to the strength of the vine.

We fruit on canes, or on spurred canes. A cane is, as we have explained, the matured shoot, or one year old wood. The spurred canes are canes cut back.

In training or pruning a vine much is left to the judgment of the operator. He looks at the arrangement of the wood and judges from the strength of the vine what amount shall be left. The general rule is to leave to each cane six, eight or ten buds. The length of the cane is determined not by the number of inches but by the number of buds, for some canes have much longer internodes than others. You must be careful in cold weather not to cut too near the bud.

There are several different systems of pruning, which we will now describe. We will first proceed and prune for the trellis. [The lecturer here drew his diagrams on the blackboard.] First, he pruned with horizontal arms. These horizontal arms may remain the same for years. From these permanent arms shoots are trained upward, six, eight or ten in number, to the height of fifteen or eighteen inches, sometimes twenty inches. The danger always is in leaving too much wood and overbearing the vine. Almost any vine may be made to bear more than is good for it. Other modifications of the renewal system of pruning the vine were illustrated on the board. The Bon system, also spur pruning, the different systems being practiced according to the object sought in training the vine.

Summer pruning is not always properly done, for the reason that it is not understood as to what the object of summer pruning should be. Summer pruning means simply the pinching in of a portion of some of the shoots for the purpose of encouraging the even growth of all. It is sometimes done in midsummer in a most injurious manner. The operator goes to cutting and slashing with his knife, for the purpose, as he says, of letting in the sun and air to ripen the grapes! This is all wrong. Wrong as to time of pruning, and wrong as to manner of doing the work. Summer pruning is really spring pruning. The work should be done early, just when the shoots begin to start, and then discontinued in early summer, and no pruning should be done except with the thumb and finger. There is no occasion for the use of the knife in summer pruning. The objects to be accomplished in summer pruning are twofold, and for opposite purposes—to thin the wood and to thin the fruit—to strengthen the wood and to enlarge the fruit—to check and encourage—to air and to shade.

In fruiting on laterals it is usual and well to pinch back the lateral to within one leaf of the last bunch of grapes. Pinch also those shoots that are running ahead of others; this will equalize the growth of all. When these lateral shoots push again they may be again pinched, and so on as long as desired.

The buds on a cane that has made large growth are not always sure to break. They are called blind buds. The smaller canes are much surer, and are the canes sought by the vine dresser for his bearing canes.

I wish, in conclusion, to impress upon your minds the importance of early summer pruning. I have mentioned this subject, and here repeat, let this work be done at the earliest possible period, and let it be repeated and fin*ished early in June.* Early pinching causes the leaves to grow larger, and I

am safe in saying that the four or five large leaves, in the position they occupy, are of more service in ripening the grapes than the fourteen or fifteen smaller leaves without the pinching.

DISCUSSION.

The discussion on this subject was very brief, and was as follows:

Mr. M. L. DUNLAP—The Doctor has told you much about pruning the grape vine. Now I do not believe in the necessity of so much pruning. I would like to hear Dr. Hull tell us something about the spiral mode of training the vine, practiced at Alton. I understand that this system of twisting the vine gives a check to the growth of the vine in favor of the production of fruit, and, further, that this system is simple and requires very little pruning in the spring.

The spiral method gives the best exposure to sunlight and air, and I would not take a leaf off in the way of further pruning. I think the great difficulty experienced at Cincinnati is too severe pruning, and I propose to demonstrate on my own grounds this season the superiority of the spiral mode of training. It is simple and economical.

There are a great many different systems of training the vine, but that which we want in this country is that which will produce the greatest amount of fruit with the least amount of labor.

Dr. WARDER—The spiral system of training is good where it can be done without danger of breaking the vine.

Mr. M. L. DUNLAP—There is no danger in that.

SWINE.

BY HON. ELMER BALDWIN.

My subject is the hog—a subject less poetic than that of the classic vine—less dignified than the story of the horse—the noble charger that bore the chivalrous knight to the combat—less inviting than Flora's fragrant breath, or Ceres or Pomona's bountiful stores. And it is very doubtful if the use of the product of the hog as human food is not decidedly deleterious to physical, mental and moral health and vigor. Yet the time is doubtless far in the future when mankind generally will appreciate that fact, and cease to go the whole hog—and the hog is not without its classic fame, it has its legends both in song and story. The victor in combat with the wild boar was in the olden time a hero among his comrades, and he was rewarded with the smiles of his lady love. And there is no animal that has furnished the same amount

of human food during the historic period. The hog belongs to the class mamalia, order Pachydermata, genus Suidæ or Sus.

The fossil bone of the hog is found in the Miocene and Pliocene deposits of the tertiary strata, associated with those of the Mastodon and Dinotherium, that seems to have been the age of Pachyderm or thick-skinned animals, only two of which order, the elephant and hog, have ever been domesticated. The fossil hog was shorter than the domestic hog of modern times, but was evidently his progenitor. The wild boar, from which our domestic hog has doubtless descended, with its closely allied species, are disseminated over near the entire habitable globe, and have been the companion of man from the earliest antiquity. The hog is a perfect cosmopolitan, adapting itself to all climates. Omniverous in its diet, eating herb, seeds, grain, fruit, insects or flesh. More prolific than any domesticated animal except the rabbit, easily susceptible of improvement, and quickly attaining to maturity, it furnishes a cheaper and larger return of food for the outlay than any other animal reared for food. Consequently, in an economical point of view, the hog occupies a prominent place, and as a source of income to the farmer, for ready sale and certainty of remunerative return, is not surpassed by any other branch of his varied pursuits. Particularly is this the case in the Northwestern States, where varied and cheap food and rich pastures make it the paradise of swine.

The census of 1860 shows that there were then in the United States thirty-three and a-half millions of swine, of which the State of Illinois contained two and a-half millions, or about one-thirteenth of the whole. The census shows that the rearing of hogs is influenced by the price of their food and transportation, the pork costing much less for transportation than the bulky food of which it is made.

In 1860 the New England States had 10 hogs to each 100 inhabitants; the Middle States, 81; the Western States, 149; the Southern States, 175; the Pacific States, 101, and an average of the United States, 106. During the year ending March, 1868, there was received in Chicago 1,883,873 hogs, estimated to be worth about $30,000,000; and during the year ending January 1, 1869, there was received 1,706,000, the gross weight of which averaged about 230 pounds, and worth over $28,000,000.

The amount of this trade may very justly stimulate our farmers to inquire as to the best system of breeding, feeding and fattening, and the best breeds on which to expend their efforts in the production of this important staple.

BREEDS AND BREEDING.

There are several good breeds which lay claim to public favor—none of which are free from defects, or which embody all the points of a good hog. The Berkshire has retained the good opinion of the public longer than any other breed, and the improved Berkshire is probably our best breed. The Berkshire was first obtained by crossing the Neapolitan with one of the large English breeds. The Neapolitan is a descendant of the improved Roman hog, probably from their best, a proof of the skill of that ancient people in that direction.

Most of the improved English breeds were obtained by a cross of th
and rather coarse English hog with the fine and delicate Chinese. T
folk is the result of one of these crosses, and is esteemed the best b
England. It is of fair size, and retains in a remarkable degree the f
tening qualities of its China parent.

The pure Suffolk is almost destitute of hair, a very serious defect un
scorching sun and dry and hot climate; it is rather tender for our
treatment, but in fattening gives a good return for all the food consum

There are several American breeds that have attracted attention,
Magee hog in Ohio, and the Chester White from Pennsylvania, both
hogs, but as yet hardly entitled to be called distinct breeds. It req
long continued breeding in one direction, with careful and judicious sel
to form a distinct breed, so that all the pigs will be of uniform cha
size and form. Till fully established, there is a tendency to breed back
rally to the most defective progenitor, and till that tendency is overco
certainty of reproduction in its perfection cannot be relied on.

The Chester White, when distinctly established, will be as most
breeds are now, valuable hogs; the square and deep form, stout and er
broad and short head, quiet disposition, good fattening qualities, and
weight, form a combination of good qualities that can hardly be surp

Although our best breeds of hogs were obtained by judicious crossi
our future successful efforts will be perfected in the same way, yet th
criminate crossing practiced by our farmers cannot be too strong
demned. There seems to be a mania for mixing all breeds, while t
should be to preserve each breed distinct and pure. We often see l
pigs with no two alike, but each a representation of some one of the
ten breeds whose blood is mingled in the genealogical compound.
made a cross of the Irish Grazier, a large, slow maturing hog, with th
shire, and then crossed that sow with the Suffolk, and the produce w
distinct breeds from the same litter—first, a fine delicate pig, that wo
ten at any age; second, a medium sized hog, that would fatten at t
eighteen months, and third, a Grazier hog, that would weigh from
seven hundred, but must be two or two and a-half years old bef
would lay on fat. Preserve the breed pure and distinct, should be th

Both parents should be at least one year old before being allowed t
and if the female should be kept till five or six years old for that pu
would materially improve the size and vigor of the pigs, while breedi
young sows deteriorates both size and vigor. The period of gestati
the sow is about sixteen weeks, or 112 days. During this period t
should never be closely confined, but should have ample room for
with free access to water. The food should be generous but not to
and heating—such as will insure the most perfect health.

The best season for sows to farrow is April, or early in May. An A
is worth one-third more than a July pig, and more than double a Se
pig. Some breeds can be fattened at any age, but none will fatten as
one year, or as much, as at fifteen or eighteen months. Any hog mus
fully at maturity before it can be easily fattened. And an April pig

t till a year from the following January at less expense and trouble than ptember pig. While suckling the sows should have free access to grass, should have a generous supply of tolerably rich slop, and if fed in a gh easy of access, the young porkers will soon learn to feed with her, . decided benefit to themselves and the mother. At eight weeks old they .ld be weaned, and if they have learned to eat with the mother, and are milk or dairy slop, with a generous supply of fine bran or coarse meal, will not fall off, but will continue growing without interruption.

growing pig should never be fed corn to any amount; it contains too h oil, and does not contain elements of growth. Light grain, bran and ts, with a good supply of grass and succulent vegetables, should constitheir food. After weaning, a pig should never be made extremely fat, it ks the growth and injures their thrift afterwards. Nor should they be aitted to become poor, a poor pig can never be made to attain the size or a it would have done had it never been stopped in its growth; like a hill orn, if it once becomes feeble and sickly, no after culture can atone for injury done. A mangy pig is worthless, and should be consigned to the ;otha where the dead animals of the farm are deposited.

eat, cleanly and well sheltered accommodation should be provided for ae, especially during the season of growth. The hog has been much idered in relation to his uncleanly habits. In some respects the hog is 'e cleanly than the cow or the horse, or most domestic animals. It is true, the Elephant and other Pachyderms, he is fond of bathing, a cleanly it, and it is more the fault of his keeper than his own that he wallows in d when better accommodations are not accessible. But if young pigs 'e to lie in a damp and dirty bed, their skin soon becomes encrusted with rf, the ears and tail frequently drop off, and the growth is at once arrested. ring the entire rearing, to the time of fattening, the animal should be t in a sleek, healthy and growing condition.

'he natural instincts of every animal must be consulted and followed to duce the best results when domesticated.

he hog is impatient of both heat and cold; any unusual exertion during heat of summer, especially if in full flesh, will frequently cost him his Comfortable shade should always be provided, easy of access, such as . protect them from the noonday heat of the summer sun. Neglect of this iexcusable cruelty, and will be a serious drawback from the credit side of pork account.

qually important is ample protection from the opposite extreme of the ter cold. Pigs dropped in the fall are unfit, with all the care that can or be given by our common farm accommodations, to pass uninjured the rity of the winter season. Early spring pigs will do much better, but a . covered, well protected, and well littered sty, where the pigs will not nore than one deep, and where their owner will not have the nightmare a listening to their unearthly screams from suffering from the biting cold, isential to successful pork raising. I do not believe that any good chris- . can say his prayers and sleep easily and quietly while the whole neighhood is made vocal by the cries of his freezing pigs.

During the cold season a proportion of corn as food is not objectionable. It is well calculated to keep up the animal heat, and from the ease and convenience of feeding, it is now and doubtless will continue to be the principal food at that season. Yet the best results will follow when most of the coarse grains, with bran made into slop, and refuse apples, potatoes, or other roots or green food, constitute the diet.

Dry grain of any kind is not the best feed, and for this reason the hogs that follow beef cattle highly fed with corn do better than when they receive the corn directly from the crib·

During the summer, before fattening, a clover or timothy pasture is indispensable to successful fattening and to economical production of pork, and the next best course is soiling with clover, timothy, or other succulent grass or vegetables. Confinement in small pens and heavy feeding with corn, is the most expensive, as well as the least successful preparation for fattening in the fall that can well be adopted. If fed through the hot weather exclusively on corn, the teeth become sore and the animal is generally diseased. At killing time the livers will generally be found diseased, and it will be found impracticable to make them put on fat.

One autumn, when corn was worth twenty cents, a neighbor inquired of me if I could tell why his hogs would not fatten, and also saying that his neighbors made the like complaint. I replied that the reason was obvious, cheap corn was the trouble; not that ten cent corn is less nutritious than when the price is one dollar, but it is fed too liberally, and neither a hog or any other animal can stand full feeding with corn alone but a few months and continue in health. The proper course is to so feed during the summer as to preserve the animals in the most perfect health, keep them thriftily growing and slightly gaining in flesh, so as to prepare them best for the fattening process, which is always more or less a health destroying process. With good clover or timothy pasture, a little corn or other grain is not objectionable, but they will do well on the pasture alone—they will grow but not fatten—and if kept through the summer on grass alone, will be in admirable condition to take on flesh; they will account promptly for every kernel of corn judiciously given them.

Their teeth and digestive organs are all fresh and in good condition, and with strong appetites and vigorous health, their advance to the condition of respectable porkers is easy and rapid. Sudden changes from solid to succulent food should be carefully avoided, and vice versa, the change from grass to heavy feeding with corn should be very gradual, especially as the fattening season commences.

There is one primary rule in fattening that should never be violated: the change of feed should always be from lighter to heavier, and never from heavier to lighter. Consequently, when taken from grass and vegetables, a little soft corn or meal should be gradually introduced. Corn cut while the kernel is in the milk is good food to follow the grass. The gradual hardening of the grain will be a proper increase of the nutrient quality of the food. When fairly established on a diet of sound corn, it should be fed on a clean floor, and in amount about what will be eaten, but not so as to have a kernel

eft. The practice of leaving a quantity of corn more than will be eaten on the feeding floor is a very wasteful and bad practice. The nice point to ascertain is to find, by measurement, the amount that will be consumed without any waste, and then to always measure the feed by that standard, varying the amount as their appetites require. There are no animals that will retain their appetites and thrive as well when fed to a surfeit, with the unused food, down and dirty, constantly before them, as they will with just enough to give healthy and full action to the digestive organs, and to preserve the appetite unimpaired. To effect this the last of each feed should be consumed with avidity. Thus the old adage, that the lazy farmer who leaned upon the fence while his hogs finished their meal, always had the leanest pork, has much significance.

Plenty of water, with occasionally a little salt, coal and ashes to correct the acidity of the stomach of the gourmand porkers, completes the required dietary. This system of feeding is adapted to corn fattening as practiced at the West.

Our eastern friends have a somewhat different system. First, having secured the necessary buildings, kettles, troughs, etc., they commence the fattening process by boiling vegetables, such as apples, potatoes, pumpkins, or any other that hogs will eat, and, when thoroughly cooked, these constitute the food for the first few days. They then commence adding a very little meal, mixing it with the hot, boiled or steamed vegetables, so as to cook it thoroughly. When the mess has undergone a slight fermentation it is ready for use. The amount of meal is very gradually increased till toward the close of the fattening season, when meal alone is given. The meal is of corn, oats, buckwheat and barley, ground, and fed either mixed or separately. This system resembles the English practice, and, aside from the labor required, is much more economical than the practice at the West of feeding on corn alone. Hogs are made equally fat in much less time.

When our grain can be made into meal as cheaply here as in New England, and labor shall be as plenty and cheap, the eastern system will deserve a fair trial here.

As to the value of corn when fed to hogs, farmers differ very widely. Instances are given where, by actual weight, hogs have put on from 12 to 18 pounds by consuming one bushel of corn. My opinion is, that ten pounds gain for each bushel of corn consumed is a fair estimate. At that estsmate, pork at $10 per cwt. is equal to corn at one dollar per bushel; or at $5 per cwt. it is equal to corn at 50 cents; but to secure even that result, the management must be judicious throughout. Hogs kept in a close pen and fed corn through the whole period of their existence, will figure up the profits on the wrong side of the balance sheet, and much depends on the breed; there will be a wide difference between results from a good and an inferior breed, with the same keeping. There is much point in the reply of the man when his neighbor wanted to get some of his breed of hogs, that "he would want his swill tub too." Yes, both a good breed and a well filled trough are essential to successful pork raising.

I will only briefly notice some of the diseases of swine and their remedies, and will then relieve your patience. I have but little faith in specific medicine as a cure for hog cholera, or any other disease to which swine are subject, and I have very little faith in a sick hog.

My practice is to turn them loose where there is water and leave them to nature and their own instincts. A larger per centage thus treated recover of any disease than when treated by any prescribed form of medicine. But a sick hog is poor property, and may be regarded, generally, as belonging to the debit side of the account of profit and loss.

The wild animals in their native haunts are seldom diseased. The wild boar in the forests of Europe or Asia, I presume, never had the cholera, but when domesticated his natural instincts are thwarted, his food is changed, he chafes under confinement; sometimes starved, then fed to a surfeit; with filthy pens, exposed to cold and heat, it is not surprising that he becomes diseased.

The laws which govern the nicely balanced organism even of the hog cannot be violated with impunity. Every species of animal has its natural food, habits, condition and natural requirements, and the nearer those can be supplied the more certain the immunity from disease. Any cause that weakens the vitality of any animal tends to invite disease. The practice of *in and in* breeding has a most injurious effect upon swine, rapidly weakening the vitality, and in two or three generations rendering them worthless, if not extinct. When thus weakened, any exciting cause will induce cholera or some kindred disease.

Sudden changes of food, especially from high to low feed, or the opposite, exposure to excessive heat or cold, and an insufficient supply of water, are among the causes of disease to be avoided.

If all the requirements of comfort, good beds and shelter, appropriate food judiciously given, plenty of water for drinking and bathing, and all the natural instincts are supplied as far as practicable, even in a domesticated state there will be little danger of disease. The old superstition that disease is the decree of fate or of unpropitious stars, has long since been exploded, or should have been, and like every other effect is regarded as the result of tangible cause. Avoid the cause and the effect will never be developed. Prevention is better than cure.

Like other domestic animals, the hog is frequently the victim of a cruelty which disgraces humanity. He is but a hog, and his stubborn disposition, which often is more than reflected by his master, is made the pretext for abuse and cruelty, but especially is he the objective point of all the worthless curs within his range; minus ears and tail, he frequently presents a living monument of his wrongs. A man frequently harbors a grudge against his neighbor, but is too cowardly to attack the man, but will dog his hogs instead. Such a man abuses his superiors.

Every animal we rear is entitled to our kindness and protection. Nor is the hog undeserving our regard. Instances have occurred where they have shown much intelligence and even affection. They have been trained to hunt, and the "learned pig" has often "astonished the natives" with his sa-

gacious performancca. The acute instinct which directs the pig straight to his home, as the bee flies, miles distant, when he was conveyed in a tight box from home, round a circuitous and crooked road, is a performance that man, with all his faculties, can never imitate.

There is no animal so low in the scale but has characteristics that excite our admiration and wonder. They are all the handiwork of the Great Architect of Nature. If we would rear them successfully we must know their natures, their instincts and their wants, and we shall learn that the treatment which kindness and humanity dictates will bring the greatest pecuniary profit. As the path of duty is the path of happiness, so kindness to the most inferior animals we rear, is the best guarantee of success.

DISCUSSION.

Mr. M. L. Dunlap—We have a gentleman here who makes a speciality of breeding hogs for the purpose of selling. Perhaps no party has sent out a larger number or a better style of pigs. I refer to Mr. Floyd. He can no doubt tell us something that will be instructive upon this subject.

Mr. Floyd—The speaker, in the excellent lecture given us, has said all that is necessary to be said. I have nothing further to add that I think would be either instructive or interesting.

A voice—At what time would you advise the commencing of feeding grain?

Mr. Baldwin—Early feeding is always better than late feeding, and having commenced to feed early we would increase the feed until hot weather is past.

Mr. Robinson—I would ask what stock of hogs is best for our State? What class of hogs is usually made most valuable in our country?

Mr. Baldwin—I think perhaps the Berkshire is as good as any.

Mr. M. L. Dunlap—I will mention a very important use that is made of the hog. In passing through this State I find that many fruit growers are using the hog to pick up the fallen fruit, that contains the codling moth and the curculio. Large orchards are supposed by this means to be kept free from these enemies. Now if this is the case, we have here a hint to fence in our orchards, so we can turn in our hogs and save our fruit. I have no doubt we shall have, before long, to adopt this plan. It is also economical. A small amount of feed will do the hogs, aside from what they get in the orchard.

The only large peach orchard that paid anything last year was Winter and Brothers', at DuQuoin, who kept hogs all the time in their orchard. They believe hogs a perfect immunity against the insect enemies of the peach. They also adopt the practice in their peach orchards of mounding up the earth around the trees. It may be a question whether the mounds or the hogs deserve the credit of saving the orchard. At any rate, we believe that if we will fence in our orchards and turn in our hogs we shall make a good use of them.

In regard to breeds, we think the Suffolk a good hog to turn into the shade of the orchard trees. I have fenced in three or four acres of my own orchard, and I am satisfied that the hogs have benefitted that part of the orchard. Nearly all the sound apples are in this hog lot, and I propose to extend this hog lot. Although I have mentioned the Suffolk as among the best for this purpose, any good hog will answer the purpose.

M. Baldwin—If you turn your hogs into an orchard where there is no green feed they will bark the trees. Hogs prefer grass, but if that is not present they will take to the trees. There is another use made of the hog. We are in some places very much troubled with the wild morning glory. It is very difficult to get rid of it in the ordinary way, but if you will turn in your hogs, they will very soon root it out. I went out one morning to find my hogs. They were no where to be seen. Presently I saw the tail of one of them sticking out of the ground. The fellow was down there after the roots of the morning glory. [Laughter.]

Mr. N. J. Colman—We in Missouri depend very much upon the nuts of the forest to furnish food for our hogs. We can raise hogs there cheaper than you can here in Illinois. I have seen trees where twenty bushels of acorns could be gathered from them. They are excellent food for hogs. I know it is said that mast-fed pork is not as good as grain-fed. Be this as it may, this is the way much of the pork counted good is made.

In feeding grain we have the lazy man's practice, we use portable fences, and let the hogs feed themselves. These fences will inclose five or six acres, and when it becomes necessary the fence is removed to another place. I am not sure that this is not the best way to fatten hogs. It is certainly better than the practice of some, who, having but one small field for the hogs, let them "root or die."

Some one inquired if a clover and timothy pasture was a good hog pasture.

Mr. BALDWIN—Timothy pasture for hogs is to me a new idea, besides, I could not recommend it. I find that hogs will destroy the timothy by rooting it out. Clover is most excellent for hog pasture. They will keep fat upon it if they have plenty of water.

QUESTION—At what time would you turn the hogs upon the clover?

Mr. BALDWIN—In the spring season, after the clover has made a good start.

QUESTION—What about the hog tamer?

Mr. BALDWIN—I think the hog tamer a good thing. I have used it. That is one thing that all farmers having hogs must look after.

Mr. H. J. DUNLAP—Would it not be a good plan to get up a breed that cannot root? [Laughter.]

Mr. COLMAN—Yes, sir; I don't know but you here in Champaign could get up such a breed. [Laughter.]

It is very essential to let the hogs have plenty of stone coal or charcoal. Give them also ashes. In regard to breeds, I may say I have been clean through the mill. I once had a great fancy for the Essex, but I found I could not propagate them. I could not keep the Essex in a condition to breed, they would put on fat. The Suffolk is a good hog. I have lost a few with the quinsy. I have tried the Berkshire and like them, but, like Mr. Baldwin, I like the Chester White best. We had, last year, a breed that came from Illinois to our State Fair, which carried off the premiums. They were, I believe, owned by a Mr. Moore, of Canton, Illinois. They were the Poland and Big Boned China hog, sometimes called the Magee hog. I think favorably of this breed. I do not know, however, that it can be called a breed, it is a cross. After all, there is a great deal in the swill tub in regard to breed. I do not think hogs can be raised profitably and feed upon grain. A clover pasture is indispensable. I agree with Mr. Baldwin in his faith, or want of faith, in pork as being a good article of diet. I would much prefer for my use a piece of mutton or beef. But the people will have pork, and it is the business of farmers to grow it for the profit there is in it.

Mr. PERIAM—In regard to feeding coal to hogs, I think this is essential, especially where three or four hundred are kept together.

Without it the hogs are very liable to disease and death. Coal acts as a preventive of disease. A hog will eat three or four pounds per week, and he seems to relish it.

Mr. Jewett—I should dislike to see this discussion close without further mention of this spotted hog mentioned by Mr. Colman. It is a hog worthy of your attention. I have grown these hogs, and would advise farmers to look at them, and if any one here wishes to look at them he can do so by crossing the street here. They are a cross it is true, but they are so carefully crossed that they will always produce the same breed or style of hogs, so that any one will be satisfied with them. I know one man that fed 430 of these hogs.

Mr. Colman—Where does he live?

Mr. Jewett—In Warren county, Ohio. It was there called the Magee hog. They are very fine hogs, and will measure more than any hogs that I am acquainted with. He has heavy hams, and they will fatten at any age.

Mr. Ennis—Do you breed more than once in the year?

Mr. Baldwin—No, sir; that is enough.

Mr. Jewett—I wish to ask Mr. Dunlap if he *knows* that sheep will feed upon the trees of the orchard?

Mr. M. L. Dunlap—I have seen orchards where sheep were kept, and where the ground was cultivated, and all the sprouts and weeds and grass kept down, the sheep would bark the trees. They should be turned out when the green feed becomes short. They are of great service, however, in eating up the fallen apples that contain the codling moth.

Mr. Jewett—In regard to sheep barking trees, I have a little experience. I turned my sheep into my orchard in Michigan and had 100 trees barked, and I watched the sheep, too.

Dr. Hull—I am fully prepared to indorse the value of hogs in an orchard. They are almost the only protection we have against the codling moth. But we wish to protest against the idea that seems to be gaining ground that the hog is a protection against the curculio in the plum. If the gentleman will come to Alton, I will take him into an orchard where hogs have been kept all the year, and yet not a single specimen of perfect fruit remains on the tree at the close of the season. Gentlemen having no experience with the curculio know not the difficulties with which we have to contend.

He gave an account of his visit at DuQuoin and Centralia some years ago, when he foretold the coming of the curculio, or rather showed them the marks upon their fruit indicating the presence of this dreaded enemy, from whose ravages they had boasted that they were free. He then told them that they must do something more than simply to turn in their hogs. This would not exterminate the "little Turk." Another fact. The curculio is not an imported insect. It is an insect of our own. It has not yet reached England. It may yet reach it, and woe to that orchard wherever the curculio is allowed to come and remain in peace!

Mr. PARKS—I wish to inquire whether the disease of hog cholera is disappearing?

Mr. BALDWIN—I have never had a case of hog cholera, and do not know whether it is on the increase or decrease. I am confident, however, that, with proper care in keeping hogs, there need be no fear from this disease.

SHEEP.

BY A. M. GARLAND, PRESIDENT OF THE ILLINOIS STATE WOOL GROWERS' ASSOCIATION.

As in the past, of all the domestic animals, none have occupied so prominent a place in the history and economy of civilized nations as the sheep, so at the present time no animal bears so intimate a relation to the comfort and necessities of the human family.

Among the many wise and bountiful gifts of nature for the welfare of the human family, none are so indispensable as this animal, furnishing, as it does, at the same time a food so wholesome and nutritious and the most comfortable and healthy of our clothing materials. And we find that man was not slow in availing himself of so generous a gift.

"Abel was a keeper of sheep," and the firstlings of his flock, offered as a sacrifice, were acceptable to the Lord; and the frequent allusions to the sheep all through the Holy Writings and Prophecies, it seems, were intended to have the double office of furnishing appropriate illustrations of the purity and usefulness necessary to the perfect man, and to fix ineffaceably upon the minds of the people of the then and coming ages the prominence of this most indispensable animal.

The shepherds upon the plains of Bethlehem were the first of men favored with a look upon the brightness of the star that marked the birth-place of the Savior of the world.

Nor is this prominence peculiar to sacred history. We find frequent allusions to the sheep in the oldest writings of China, Persia and India, and representations of them are found carved upon the monuments of ancient Egypt.

More than two hundred and fifty years ago (in 1613), John May wrote, concerning the famous "wool sack" upon which the Lord Chancellor of England has sat for ages, as President of the House of Lords: "The antiquitie of wool within this Kingdom hath been, beyond the memorie of man, so highly respected for those many Benefits therein, that a customable use has always been observed to make it the seat of our wise, learned judges, in the sight of our noble Peers (in the Parliament House), to imprint the memorie of this worthy commoditie within the minds of those firm supporters and chief rulers of the land." *

Mr. John L. Hayes, in an admirable paper, read at Philadelphia in 1865, says of the sheep: "This species is endowed with a plasticity, so to speak, so very remarkable that it is more susceptible of modification than any other animal except the dog; so that 'the breeder,' as Lord Somerville says, 'may chalk out upon a wall a form perfect in itself, and then give it existence.' Hence peculiarities are developed in the coverings of different races produced by man, which make the distinctness and variety of fabric which characterize the wool manufacture; and thus we have the coarse Cordova and Donskoi wool for our carpets; the noble electoral wools of Saxony and Silesia for our broadcloths; the strong middle wools of the Southdown and our native sheep for blankets; the soft, long and finer merino wools of France, Vermont and Michigan for thibets, delaines and shawls; the longer and coarser wools of the Cotswold and Leicester races for worsteds in their thousand applications; the very long and bright haired lustre wools of Lincolnshire for alapaca fabrics, and, lastly, the precious, silky Mauchamp wool, the recent triumph of French agronomic skill, rivaling even the Cashmere, for shawls, and the Angora for Utrecht velvets."

The docility, hardiness, easiness of keep and prolificacy of the sheep—strong arguments in its favor in semi-barbarous countries like Australia, South America, Africa, and some parts of Asia, are found to increase in force when mixed with the agriculture of more civilized nations.

SHEEP AS FERTILIZERS.

There is an old Spanish proverb to the effect that "gold springs up where the foot of the sheep has trod." This is literally true as applied to the wealth that lies hidden and undeveloped in the soil. It is certainly not necessary here to dwell unon the expediency, not to say absolute necessity, of maintaining the fertility of our soil. As fertilizers, sheep are unrivaled among the domestic animals. Beneath their "golden hoofs" we see the fields of Great Britain, after centuries of cultivation, rivaling in productions of wheat, and excelling in their yield of grasses, the fertile prairie lands of our own and other Western States. The preponderating, the undisputed, testimony of many of the most successful farmers of Great Britain is, that farming, though now profitable, could not remain so, in many localities, without sheep.

Blest as we are with a virgin soil of unsurpassed fertility, we should constantly keep in mind the fact that it is not inexhaustible; and the sooner we

* See Smith's Memoirs, Vol. I.

give heed to this fact, and learn to diversify our industry, so as to preserve in our soil its original fertility, the better for the most of this generation and all of the unborn millions that, after it, are to find homes and a livelihood upon the bosom of our vast prairies, and along the margins of our beautiful streams.

Sheep should be handled upon every farm in connection with the raising of grain crops. They occupy a place in the economy of the farm that no other animal can fill so well, in consuming the straw and cornstalks and other refuse fodder.

The facility with which the product of the flock is transported is a strong argument in their favor. The greatest drawback in the raising of the great staple of the Northwest, Indian corn, is the expense of getting it to market. We daily see the price of corn quoted, in our lake shore and Eastern markets, at a pretty high figure, but the rejoicing of the farmer is pretty thoroughly alloyed when he reflects that from one-half to two-thirds of this round price has to be paid to railroads for transportation. As sheep are usually fed in Illinois, it requires a bushel of corn to make a pound and a quarter of wool. How much better then to transform our corn into wool, which can be sent to the same Eastern markets for one-tenth to one-twentieth its selling price. The only better way than this would be, after having transformed our corn and grass and straw into wool, to bring the manufacturer to our doors, and let him and his operatives furnish a home market for the other products of the farm, while saving the transportation of the wool one way, and the cloth back again.

LEGISLATIVE PROTECTION NECESSARY.

Notwithstanding these incentives to a generally diffused sheep husbandry, the history of the "flock" in the United States is an eventful one. The instability that has characterized our national legislation, with its bearing upon wools, both in their raw and manufactured states, has shrouded the business of both the grower and manufacturer of this staple with a cloud of uncertainty, alike detrimental to the interests of both; so that the past history of sheep with us can not be written, nor their future conjectured, without touching upon that principle of political economy affecting this and all other branches of industry—the protection of the American against the competitive labor of persons living on lands without cost, in a climate without winter, under a government that imposes, if any, but a nominal tax, and in a state of society which requires but little for its support.

The grower of wool here needs to have the protecting arm of his government thrown around him, in so far that the necessities of his situation, such as high taxes for the support of the government, schools, churches, and the other adjuncts of an advanced civilization, place him at disadvantage when brought in contact with the producers of wool who are exempt from these burdens. Without here attempting an argument in favor of a protective policy in our national legislation, let me say in passing, that, in my humble opinion, such a protective or defensive policy leads to the only road through

which the American producer can ever reach that firm basis from which he can defy the competition of the world. France pursued such a policy until the justly celebrated Rambouillet wools were relieved, by their own excellence, from all competition, when even the producers themselves consented to the abolition of all duties.

The culture and increase of flocks of sheep are, with us, a national necessity. The United States, dependent upon Australia or South America for her raw clothing material, in the event of a foreign war is at the mercy of any power that can man and float half a dozen war vessels. This insignificant force, by depriving us of the means to clothe our army and our people, could freeze us into terms that, under more favorable circumstances, could not be extorted by the combined navies of the world. I have no envy for the foresight of the statesman, or the patriotism of the journalist, who would place his country in a position exposed to such danger. We must defend both the agriculturist and the mechanic, the manufacturer and the laborer, against the cheap labor of Europe and the semi-barbarous countries, even though it costs something to do it. This was the policy of every manufacturing nation of continental Europe after Peace had spread her wings over the desolated war path of the First Napoleon, and the result we see to-day in the thousands of workshops and factories that make Europe one vast beehive.

At that time the policy of England was to keep the other nations dependent upon her for their manufactures, not only of clothing but all other artificial necessaries; and one of her statesmen, Lord Brougham, while urging the great advantage to accrue from such a condition, said: "England can well afford to incur some loss in the export of English goods for the purpose of destroying foreign manufactures in their cradle!"

GENERAL SUGGESTIONS.

The period of gestation with the sheep is five months, though exceptions to the rule, in a variation of two or three days, and sometimes even a week, are not uncommon. The great fundamental law of nature that "like begets like" finds no more exceptions with the sheep than with other domestic animals. In breeding use none but the best animals, and be careful that lambs do not come in the spring before you have grass for the mother. Attention to these points will relieve the farmer of much labor and loss, and go very far towards insuring a healthy and vigorous offspring.

WOOL PRODUCTS OF THE WORLD.

In the United States, with an annual clip of about 100,000,000 pounds, the home demand for wool exceeds the supply by nearly one-third. It may be of interest here for us to inquire for a moment where the wool is raised that clothes the world. The latest estimates available are German.* These place the production of the wools of the globe at 1,610,000,000 pounds, or one and one-quarter pounds to each inhabitant, calculated upon an estimated population of 1,285,000,000 people.

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* U. S. Economist, June 10, 1865, also address of John L. Hayes.

The amount set down to each country is as follows:

England	260,000,000	pounds.
Germany	200,000,000	"
France	183,000,000	"
Spain, Italy and Portugal	119,000,000	"
Australia, South America and South Africa	157,000,000	"
Russia in Europe	125,000,000	"
United States	95,000,000	"
British North America	12,000,000	"
North Africa	49,000,000	"
Asia, at a very general estimate	470,000,000	"

In the manufacture of carded or clothing wool, from statistics collected at the recent Paris Exposition, the leading countries of the world stand relatively thus:

Rhenish Prussia, first for men's wear; France, first for women's wear; Austria, second for women's wear; France, second for men's wear; Belgium, third for men and women's wear; Prussia, fourth for men and women's wear; England, fifth for men and women's wear; the United States, sixth for men and women's wear, and Russia seventh for men and women's wear.

In combing wool fabrics, France stands first and England second; the other European nations showing nothing to particularly distinguish them from each other.*

The largest flocks of sheep of which we have any knowledge are in Russia. †

Mr Michael Bernstein, of Odessa, describes his production as follows: "The flock of Falz Feim consists of 400,000 animals. The last shearing produced 30,000 poods, washed, and sold for 870,000 rubles, or 2,974,500 francs," or, in plain English, 1,250,000 pounds, selling for $595,000. Another flock is mentioned, as the property of Mr. Tilibert, consisting of 70,000 merino sheep.

We have in the United States not far from 35,000,000 sheep of all breeds. By far the greater part of this number are of the merino family and its crosses. "The merino breeds are distinguished amongst the various types of the ovine species by the fineness of their wool and the abundance of their fleeces." The product of these, with occasional combinations of foreign wool, and, I am sorry to say, sometimes shoddy, are made into the characteristic woolen fabrics of our country, such as plain and fancy cassimeres, sackings, repellants, tricots, beavers, cloakings, woolen shawls, and the different varieties of flannels. With proper encouragement the American grower will soon be enabled to furnish all the card wool or fine wool clothing needed by our population.

* Report of E. R. Mudge, U. S. Commissioner of Paris Exposition.

† Ibid.

AMERICAN MERINOS.

It is cause for just pride to know that to such a high state of perfection has fine wool sheep husbandry been brought in Vermont and some other localities, that the American merino, now recognized as a distinct type, stands unrivaled in the ovine species for symmetry of form, strength of constitution, and in compactness of its fleece. These excellencies are the more gratifying in view of the fact that they have been attained without the sacrifice of that hardness and capacity for enduring long journeys, and aggregating in large flocks, that were such prominent characteristics of their trans-Atlantic ancestors.

Many prudent and successful feeders pronounce this the most profitable sheep for the stall, and they furnish a quality of mutton admitted by many good judges to nearly equal the famed Southdown. It is the generally accepted opinion of those best informed, that this class will furnish a greater return in wool and mutton, for an equal amount of feed and attention, than any other. The exceptions to this rule, if any exist, are to be found in close proximity to large markets, and upon very high priced lands. The weight of fleece from some of these animals is enormous, and shows, in an eminent degree, the success that has attended the efforts of the American breeders in improving upon the original stock as imported from Spain in the early part of the present century. Single fleeces, weighing from eighteen to twenty-five pounds, are frequently taken from choice rams, while in a few exceptional cases as high as thirty pounds has been clipped from a single year's growth. From ewes fleeces have weighed from nine to sixteen pounds. This is of wool in an unwashed state, and quite often is made up of gum or grease.

HOUSING AND PAMPERING.

The custom of housing, feeding too highly, and in every manner unduly developing and retaining in the wool the oily secretions of the animal, has been carried to an extreme no honest practical breeder will justify, and has undoubtedly operated to the disadvantage of all parties—affording, as it has, the opportunity for the impostor to palm off upon the inexperienced purchaser animals either entirely worthless, or at best of very inferior merits. This practice has tended largely to bring "full blood" and "show sheep" into disrepute. Many who have been thus imposed upon now stand ready to denounce the "sheep business" as an unremunerative humbug, and those engaged in breeding choice animals as cheats and impostors. With the cynical statesman of Roanoke, they are ready to "walk half a mile any day to kick a sheep." The housing, and otherwise pampering, of sheep is not necessarily a fraud. If parties resorting to such a custom would inform the purchasers of their animals of the manner in which they had been handled, probably no wrong would be done. I say probably, for any one having experience in such matters will appreciate the difficulty in arriving accurately at the real merits of an animal that has been thus highly pampered. At best it is a useless expenditure of time and money, and unless much intelligence and care

are exercised will redound to the detriment of the constitution of animals and their offspring. Animals possessing real merit do not require any artificial adornments to recommend them to the breeder of judgment and experience, and the sooner the practice is abandoned the better for all parties.

The very severe tests by scouring, to which many fleeces have been subjected lately, demonstrate, however, a marked improvement in the weight of cleansed wool. The tests conducted by the Board of Agriculture of our own State, in 1866 and 1867, developed fleeces averaging from five to seven pounds when thoroughly scoured; while in some Eastern States fleeces have been found to average as high as six, seven and eight pounds—and at least in one instance reached over nine pounds—nine pounds three ounces. This considerably exceeds the weight of the unwashed fleeces of the best Spanish rams at the beginning of the present century, which Youatt places at eight pounds, and Livingston at eight and a-half pounds. It may be of interest to note here that American merino rams are now being transported to Australia—sent there to give "quality and body to the degenerated wools of that locality."

TYPES OF THE MERINO FAMILY.

Of the merino family we have the different types of Spanish (which is the foundation of all the others), the French, the Saxon, the Silesian and the American.

THE MAUCHAMP MERINO.

This part of our subject would not be complete without reference to a new and now perfectly established race, remarkable for its soft and silky fleece, called the Mauchamp Merino. About forty years ago (1828), there was accidentally produced upon the farm of Mauchamp, department of Aisne, in France, cultivated by M. Graux, a ram lamb, badly, even monstrously, formed, with a wool remarkable for its softness, and more especially so for its lustre, which resembled that of silk. Mons. Graux carefully raised this animal and used it for reproduction, obtaining some lambs similar to the sire and others similar to the dams. He then took the animals resembling the sire, and by a careful and tedious course of in-and-in breeding succeeded in forming a small flock, whose wool was perfectly silky. After this he applied himself to the somewhat easier task of modifying their size and form, both of which were objectionable, and has so far succeeded that his flock is said now to compare favorably in these respects with the French Merinos, of which they are an offshoot. A commission of Savans who reported upon the qualities of this new race to the Imperial Society of Acclimatation, say: "The silky wool is destined to replace completely in our own industry the Cashmere which comes from Thibet. It is fully as brilliant as Cashmere, fully as soft; and while it costs less as a raw material, it requires less manipulation to be transformed into yarn, since it does not contain the hair, which must be removed from the Cashmere."

It is greatly hoped that the utility of crossing the Mauchamp with the American Merino will soon be tested by some breeder of the requisite capital and enterprise.

Since writing the above paragraph I have seen the remarks of Hon. John P. Reynolds upon the Mauchamp Merino, in his able report upon the Paris Universal Exposition, and wish here to call attention to them as the opinions of a gentleman of enlarged and liberal views, and the result of a long study, having for its object the good of the agricultural interests of our whole country. Mr. Reynolds seems to entertain no doubt that the cross alluded to could be made profitable in this country, in view of the greatly increasing demand for fine combing wools, and cites the result of experiments in crossing them upon the Rambouillet sheep of France, in proof of the correctness of his conclusions.*

LONG WOOLS.

The long wool breeds are generally distinguished by great precocity, and in raising them the item of mutton is the prime consideration, and that of wool secondary; and in England, where are to be found the most perfect types of this variety, a remarkable success has been achieved in the development of those particular parts of the body giving the best meat, and in producing animals capable of being fattened with the greatest economy and at an early age.

This branch of sheep husbandry, presenting as it does so inviting a field to the farmer, has been too long neglected. Of the long combing wools we consume annually some 6,000,000 pounds,† for a large proportion of which we are dependent upon the British Provinces, from whence we also draw largely for our supply of mutton. Since the abrogation of the Reciprocity Treaty with Canada this interest has received quite an impetus, and if properly fostered and protected will soon take its proper rank in the industrial economy of the country.

RECIPROCITY TREATY WITH BRITISH PROVINCES.

And here let me remind you that a movement is on foot to re-establish the Reciprocity Treaty, which, if successful, will be a death blow to the long wool interest in the United States, and, by sympathy, will greatly injure the fine wool interest. The committee on Ways and Means, at the last session of Congress, reported in favor of referring the question of re-establishing the treaty to the Secretary of State, who is thought to be in favor of granting "free tickets" to such part of the world as he cannot *buy*. This reference, if agreed to by the House, is but one way of voting for the treaty, by dodging a direct vote against it, as Mr. Seward will of course recommend it to the Senate for ratification. The treaty as it formerly existed meant only free use of the New Foundland fisheries for the fishing States, and free lumber for New York, and so far as the agricultural interests of the country may be

* Report of John P. Reynolds to Governor of Illinois, 1868.
† Mudge's Report.

concerned had no reciprocity in it. The true policy for us stands opposed to letting any people have the free use of our markets who do not help us pay the expenses of this government. If Canada, or any other country, wishes to enjoy our commercial privileges, let her throw aside the soiled and ill-fitting garments of royalty, and enter into the fold at the open door, for whoso "climbeth up some other way, the same is a thief and a robber."

VARIETIES OF LONG WOOL SHEEP.

Of the long wool varieties, those most generally introduced into the United States are the Leicesters, the Cotswolds and the Southdowns—though some others are finding their way among us.

The *Leicester*, (probably more generally diffused through England than any other variety) is the result of the remarkably successful efforts of Robert Bakewell, (for whom they are sometimes called,) to produce a profitable mutton sheep. His experiments commenced more than a century ago, and, to use the language of another, "was a successful effort to form a sheep suited to low land and rich pasturage, that would produce the greatest amount of salable mutton from the least food in the shortest time." Their peculiar propensity for fattening may be inferred when it is stated that animals with a coating of fat six inches thick around the entire body are not uncommon.

The *Cotswolds* are a hardier variety, generally exceed in weight, and mature as early as the Leicesters. After these we have the family of "Downs," at the head of which stands the justly celebrated *Southdown*, furnishing the most popular mutton, both in this country and England, from whence they were imported. They more nearly approach the Merino than any of the longer wooled varieties, in their ability to subsist on scanty pasturage and to endure severe exposure.

The *Hampshiredown* is the offspring of a Hampshire and Wiltshire ewe coupled with a Southdown ram, and exceeds the latter in size of carcass and weight of fleece.

The *Shropshiredown* is the result of several crosses between the "Clun Forest," the Ryland, the Hampshire and the Southdown. Their chief characteristics are their fecundity and freeness from liability to disease.

The *Oxforddowns* were produced by coupling Cotswold rams with Hampshire ewes, with an occasional dash of Southdown to perfect the cross.

Of the Lincolns, the Herefords, the Cheriots, the Romney Marsh, and other varieties not yet introduced in this country in any numbers, I will not take time now to speak.

GENERAL REMARKS.

The late civil war gave a wonderful impulse to sheep growing in the United States, as evinced by an increase of ten millions in the number of animals, and a heavy per cent. in the amount of wool. The very general desire to embark in the "sheep business" is fresh in the minds of all. Men of every capacity and avocation made haste to get rich by becoming the owners of sheep. The reaction from this excitement, owing to a number of causes,

readily understood by the business man, has been so severe that under its pressure many have become discouraged, and are turning their attention to other branches of business. Flocks have been sold for less than the value of a single year's clip, or have been slaughtered for their pelts and tallow. Like Bunyan's Pilgrim, we have long walked in the "Valley of Humiliation;" but I firmly believe the darkest hour has passed, and that the immediate future for the wool grower has in it much of encouragement. The stock of raw wools is so low that already we have complaints from purchasers that they have a limited opportunity for making selections. The past year has seen a holocaust among the flocks of the country without a parallel. Nearly forty thousand sheep per week, for the last three months of 1868, were slaughtered in the city of New York alone; while Boston, Philadelphia, and other cities have absorbed more than their usual average. The city of Chicago consumed during the entire year some four thousand per week. We did not raise as much wool in 1868 as we did in 1867, and the clip of 1869 will show a still further decline. So, reasoning from the well recognized laws of supply and demand, both wool and mutton must bring a fair price for sometime to come.

The relative position of wool in our markets for the past two years has been an anomalous one. The average price of wool in Boston market for 25 years preceding the war, was, according to the report of the Revenue Commissioners, 42.8 cents, and that it will soon find its level with the other products of the country there can be no doubt, *except the stability of the present tariff*, which is just now beginning to show something of its legitimate effect. Let the tariff upon foreign wools be repealed, or materially modified, and the days of prosperity, almost of hope, for this great interest are over, until such time as the wisdom or necessities of our people shall demand its re-enactment.

In proof of the correctness of the foregoing views, let me call attention to some speculations upon the future of wools in the New York Economist, a paper whose unremitting devotion to the importing and free trade interests ought certainly to relieve it of all suspicion of an intention to excite the market in behalf of the domestic wool growing interests; it says:

"The heavy importations of wool of 1866 are about all worked off, with very little wool in the country to fall back upon. We do not see why wool at present prices is not the best property at the present time for an investment, and we think those parties who are now laying in stocks are acting wisely, for we cannot see what is to prevent an advance of wool. We do not think the plea that manufacturers are well stocked is a valid one. Nor do we think those farmers are acting wisely who are selling their sheep at a monstrous low price, or slaughtering them for their pelts and tallow. We think it would be well for them to remember the old adage of 'waste not, want not.' * * * * * If farmers will be reckless, and sow the wind, simply because things do not exactly suit them, they must not be surprised if they do have occasionally to reap the whirlwind. They may depend upon it that for the next ten years sheep husbandry will be the best investment that can be made in agriculture."

In view of the fact that the United States has but one sheep to 57 acres of her domain, and as we produce but little more than two-thirds of the wool we manufacture, and a much smaller fraction of the amount we wear, sheep husbandry certainly does present the most inviting field now open to the American farmer; and why the prosperity vouchsafed to those who embark in it by the eleventh-hour prophet of the Economist should be limited to ten years I can see no good reason. Our people are rapidly learning that mutton is the healthiest of all meats; and that they are promptly acting in the light of this new knowledge the reports of the live stock markets at the great commercial centers abundantly prove. Why, then, should the wool grower be discouraged? That, with an over-stocked market, a general financial derangement, and an unsettling of values, incident to the transition from a time of war to a time of peace, the result has been very unsatisfactory footings upon their balance sheets for two years past, no one can gainsay. But what branch of business is exempt from vicissitudes? The fact is that wool has shown, for a series of years, fewer and less extreme fluctuations than any other commodity the farmer has to sell. A review of the market quotations in Chicago for ten years show that the highest price wool has sold for is $1 per pound, and the lowest 27 cents; the highest corn has sold for is $1 12, and the lowest 38 cents; the highest wheat has sold for is $3, and the lowest 58 cents; the highest hogs have sold for is $13 per hundred, and the lowest $3; the highest hops have sold for is 60 cents per pound, and the lowest 4 cents—showing for wool a fluctuation of 369 per cent., against 300 per cent. for corn, 500 per cent. for wheat, 430 per cent. for hogs, 1,500 per cent. for hops, or 369 per cent. on wool, against an average of 683 per cent. on all other products.

CONCLUSION.

Though days of adversity may occasionally overtake the wool grower, let him stand firm, hold fast, take good care of his sheep, and in the end they will take good care of him. The sheep never dies entirely insolvent. Even when starved to death, he leaves his pelt as a legacy to the cruel master who denied him food.

No business is exempt from vicissitudes, as can be read in the melancholy history of the wheat grower. Winter killing, blight, rust, the chinch bug and the midge, have made his fortune a checkered one. The grower of five and ten cent corn has had his share of misfortune in years past. The hog cholera has plowed its deep furrow through the fortunes of the pork grower; and to-day the Texas or Spanish fever hangs, as a sword of Damocles, over the millions of cattle that constitute the present wealth, and upon which are built the high hopes for the future, of so many farmers.

Though the prospect may not be dazzling, no surer avenue to an independent prosperity is open to the people of this country than the one presented through an increase of the growers and manufacturers of wools. Nature has placed within our grasp all the elements that go to make a people great. Millions of acres of grass annually wave a welcome to flocks and herds that

come not, and, in their turn, go down before the destroying fires of to mingle their ashes with the accumulated fertility of the centuri them. Unnumbered streams unceasingly ply the water-powers th had if we will but take them. Inexhaustible coal beds wait for the ing hand of the miner, as the bride waits for the coming of the brid and, when assisted by fair and judicious legislation, state and nat learn to utilize all these gifts so lavishly bestowed; then, and not will this mighty, undeveloped valley of the Mississippi be what God it should be, not alone the garden, but the granary, the factory, and t shop of the world!

FRENCH BREEDS OF SHEEP, AND THEIR IMPROVEMENT BY CROSSES W SPANISH RACES.

The breeds of sheep in the north of Spain form three groups, distinct, and characterized; first, by ther form; secondly, and pri by their fleeces. These three types are designated in their native under the names of Merino, Churra and Lacha.

First, of the Merinos, or fine wools. The Merino race, in Navarr bles somewhat the type which is usually found in France and other of Europe, under the same name. Small in size, rather pot-bellied, gether presenting a sorry appearance, the only valuable feature ab is their wool. This is short, frizzled, fine and knotty. This race h years lost much of its relative value, even in Spain. Raised prin Estramadura, New Castile and Soria, it forms the major part of t tory flocks; nevertheless, this race is now less appreciated in the nc in the west of the Peninsula. Increasing slowly, yielding only a quality of mutton, they are not even profitable for their wool, whicl exceedingly fine, is too little in quantity to make up for the othe qualities. Consequently, this race is very little noticed in the fairs agricultural exhibitions, the highest prizes being given to the otl which are usually much better represented.

Second, the Churra race, or curly wools. They are much more in Navarre, and infinitely more esteemed than the preceding race. much stronger and taller, wide in the shoulders, and closely built in quarters. The wool is of medium length, curly and rather coarse. held in high estimation for the fine quality of their mutton.

Third, the Lacha breed, or long wool. The distinguishing mark breed are medium height, larger in the hind quarters than precedir fine head, black sometimes, small horns, and frequently without ar race is particularly remarkable for the great length of its wool, whi times measures 30, 35, and even 40 centimetres (12, 14 and 16 inche ing frequently to the ground, and giving to the animal a very singul very much resembling the lama.

This curious race lives upon the southern slope of the Pyrenne north of Navarre, and principally in the districts of Irun and Valca

was constantly out of doors, night as well as day, either in sunshine or ade, remaining, without inconvenience, exposed for weeks at a time, to nstant rain, which slips off from their thick fleeces without hurting them i the least.

They are never fed except when the snow covers the ground, and then only little straw and dried leaves, which serves to sustain them till the snow appears. Some shepherds, during the lambing season only, place their ocks under shelter.

Their mutton is reckoned a little less valuable than that of the Churra ice, but is nevertheless of good quality. With a little extra feed they fatten apidly.

Their fine fleeces are very valuable, and they supply the greater part used i the fabrication of the famous Valentian cloaks. It is remarkable that this ice, to which its long wool gives such a characteristic aspect, although living i the same manner as other races, is not subject to so many diseases, and especially those which so often decimate the other Spanish races.—*Le Journal Agriculture Pratique.*

DISCUSSION.

Mr. Rice—I will give my experience in the sheep business. he speaker here gave a minute account of the manner in which e was led into the keeping of sheep. He formerly lived in the orthern part of the State. Commenced keeping sheep in 1856. aid for the first bought $1 per head; afterward bought Vermont heep, at $2 50 per head. He bought of a farmer who had beome disgusted with the sheep business. This farmer paid $22 ach for what he sold at $2 50. The amount of wool taken, and ie price received for it, was very satisfactory. He purchased a Ierino buck, and the cross brought him fleeces of wool of seven ounds each. Besides the wool was fine. The people came to et it for stockings. He increased his flock to 200, and with it is profits increased. Finally, he sold his farm, and his sheep ith it, except 62, none over three years old. The conclusion of ie whole matter was that he would rather keep sheep than any ther stock. "I think," he said, "it is very foolish now, when ie price of sheep and wool is down to a low figure, to turn atteniion away from sheep. I do not believe there will ever be a time hen sheep will be as low as now.

But I do not wish to occupy the time. I will say, however, iat I think we can cross the fine buck with the coarse ewe, with ood results.

Mr. Scott—I have some experience in raising sheep, though not with the fine-wooled variety. I breed some of the Southdowns and Cotswold, and sent to Kentucky to get them. My experience is that the Cotswold is not adapted to this cold climate, and in some seasons the wool is inferior. But my Southdowns continue to improve. I consider them the best for our small farms and cold climate. They do not yield as much wool or mutton, but it is better mutton, and commands a better price. I recently sold two car loads of these sheep in Chicago for six and three-quarter cents, when common sheep were selling at four cents. I have on several occasions sold these sheep at an advance of one and a-half cents over common sheep. I wish to say in regard to the dog question that I fear our farmers will have to abandon sheep raising on account of the dogs. Very recently the dogs got into my flock and killed from forty to fifty lambs. I consider that they injured the flock one-half.

Mr. Rice—I ask whether dogs are considered property in the State of Illinois?

Mr. A. J. Dunlap—Perhaps the gentleman will find out if he kills somebody's dog!

Mr. Rice—I have tried it.

Voice—They are taxed, or should be.

Mr. Scott—I would be willing to pay a tax of five dollars on any dog that I was willing to keep. I cannot see why any man wants to keep anything about him that is not worth enough to be taxed. It is only the worthless dogs that run about the country that give us this trouble and loss.

Mr. H. J. Dunlap—Many act upon the principle "you kick my dog, you kick me."

Mr. Robinson—I would recommend for the dogs a piece of mutton with strychnine on it. I would not hesitate to give it to them.

Mr. Scott—If I put out poison on the highway and kill the dog, I think the way the law stands I am liable for the value of the dog.

Mr. Baldwin—I think if the farmers of the State would petition the Legislature they could secure the passage of a law providing that no man shall keep a dog without a license and the payment of five dollars. This would dispose of worthless dogs, for no one would pay five dollars for a dog good for nothing. I

know no better way. I think the Legislatnre would pass such a law. This is the law in Massachusetts.

Mr. Scott—I would ask permission here to introduce a resolution:

Resolved, That we respectfully request the Legislature to pass a dog law in this State similar to that of Massachusetts.

Mr. M. L. Dunlap—Perhaps we had better examine this question a little. To-morrow we expect to have this Legislature with us. At least we have notice of the coming of about fifty of them. Let us consider well what action it is best to take in this matter. In New York they have a dog law fund. Every man that has sheep killed comes and makes complaint, and if he can prove that the dogs, or dog, killed the sheep, he can get the full value of the animals from this fund.

The difficulty is in the proof. You cannot convict any man's dog of sheep killing. You may know that a dog killed the sheep, but you cannot know, perhaps, that any particular dog did the killing. Now if we had such a general fund from which we could reimburse the farmer, it would be encouraging to those engaged in raising sheep. Now let us ask the Legislature to pass such a law. It is the great hindrance in the way of sheep husbandry, that we have not such a law. Great flock masters, like Mr. Garland, can afford to keep a man with them. Give us this law, and in two years we will double the number of sheep in this State. I prefer to send the pork off and eat the sheep. It is more healthy. When we dispose of the dogs we can have mutton.

Mr. Garland—Let me call your attention to the dog law in the state of Ohio. It provides that each man shall return the number of his dogs and the value, and upon which valuation he pays tax. If, by accident or otherwise, his dog is killed, the man killing the dog pays the value placed thereon, and that is the end of it. We had a law in New York which placed a tax upon dogs of one dollar. We found that it did not work well, for the man who had the least of anything else had the most dogs, and when the tax gatherer came round he could get nothing, and that was the end of it. The law of Ohio we found most practicable.

Mr. Scott—I still like the Massachusetts law best. I do not think the one dollar tax is the thing, for we know, as stated by Mr. Garland, that the man who has the most dogs has the least of anything else. But this putting a mark upon the dog is a dif-

ferent thing. It reduces the number of dogs. We want to get rid of three-fourths of the dogs in the State.

Mr. M. L. DUNLAP—I think we can soon settle this question. I therefore move that Messrs. Garland, Scott and Baldwin be appointed a committee to draw up a law to be presented to our Legislature.

Dr. WARDER—I keep two dogs. One I value at fifty dollars; the other is a plaything, valued at five dollars. I would not keep a dog that was not worth the taxes. But there are too many worthless dogs in the country for the good of those who keep sheep. I know the difficulty in collecting the dog tax, and know it is not successful. I will tell you what I do. I prepare strychnine and salt my sheep with it. The dogs get it. [Laughter.] I make a great many enemies by it. I could not be elected a constable in my district, because they say they will not vote for a man that will kill a poor man's dog. Still these same men will sit at my table and eat my mutton. They forget this when they come to vote.

The resolution of Mr. Dunlap passed.

QUESTION—Can sheep be cured of the scab?

Mr. GARLAND—I think they can. I cured a flock of 1,000 by dipping them in a strong decoction of tobacco water. The difficulty is in dipping only once. Two applications are necessary. I have on two different occasions cured sheep of this disease in that way. There are a number of nostrums through the country, but they are worthless.

QUESTION—Would it not be best to remove them from the flock?

Mr. GARLAND—Yes.

Mr. GARLAND, in answer to a question of Mr. Rice, said: When the wool is long it requires three or four times as much liquid. I raise a platform, and the juice runs back in the tub. I send to St. Louis and get the sweepings that are bought cheap.

Mr. ROBINSON—Are stems used?

Mr. GARLAND—Yes; but I do not think they are any cheaper than the leaves, had in the way I have suggested.

A VOICE—I will state that a neighbor of mine tried this remedy without success.

Mr. GARLAND—I think the only difficulty must have been in the thoroughness, that is in the want of thoroughness.

QUESTION—How would you treat foot rot?

Mr. GARLAND—I have never been very successful with this disease. It is most difficult to cure. I had rather have scab in my flock three or four times where I would have this once.

Mr. RICE—I will give a receipt which I have tried in a small flock—butter of antimony and corrosive sublimate.

Mr. GARLAND—I have used butter of antimony, and the objection to it is it is too expensive in large flocks. We have also used common blue vitriol, at an expense of fifty cents for 500 sheep; but none of these things are very successful.

Mr. MINER—Suppose mutton to be the object, what variety or cross would you recommend?

Mr. GARLAND—If you have the Southdown you are at the top of the ladder. You do not need anything better for mutton.

The Merino sheep accumulates fat rapidly on the outside, but not on the inside; but the Southdown does not take on fat in this way. I would say all the time that the Southdown is at the head for mutton.

Mr. SCOTT thought, on farms well sheltered, the Cotswold most profitable for wool and mutton.

Mr. M. L. DUNLAP—Our Canadian neighbors grow Cotswold, and prefer it. Now there is this difference in the mutton of the two. The Southdown makes mutton steak, the Canadian boils his and eats it cold. As to the fat, you can pick out that and use it as lard. And this is the best mode of cooking.

AGRICULTURAL BOTANY.

A LECTURE BY ASSISTANT PROFESSOR THOMAS J. BURRILL.

As we look abroad over the land we see upon every side, in infinite variety and endless forms, evidences of vegetable growth. The stately century-clad trees of the forests, the fragrant flowers of spring and summer, the nutritious grasses weaving their carpets of green, and yielding their riches in almost every quarter of the inhabitable world, the mosses and lichens that cover the bark of trees and wreathe themselves in curious forms even upon the tombstones of our cemeteries, the green scum of stagnant pools, the moulds that cover as with hoary age the damp walls of our cellars, and infuse themselves into the neglected preparations of our food, and other forms still more minute, that irreverently plant themselves in the very tissues of our own bodies, causing eruptions, ringworm, and possibly scores of diseases yet to be ascertained—these, and such as these, in the countless hosts of their number, their myriad forms, their untold value and their seldom ever appreciated import-

ferent thing. It reduces the number of dogs. We want to get rid of three-fourths of the dogs in the State.

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ance, are the rich legacies which the vegetable kingdom, in the accumulated ages, has left and is still leaving as the munificent inheritance of man. We cannot fix the price of their value. Mathematics may extend its line to the sun and weigh with poised balance the innumerable worlds of the heavens. but its widest reach and greatest bearing forms but the alphabet of an expression for the worth to us of plant life. Let us bargain away the atmosphere we breathe, and pass to the auctioneer, to be sold without reserve to the highest bidder, the water we drink; let the solid earth itself tremble and pass away in thin air, and our lives will be quite as hopeful as when vegetation forgets its office and the plants of the forests and the fields cease to minister to our necessities. They furnish us, directly or indirectly, with all our food, our clothing, our fuel, the greater part of our building material, the white sheets upon which we write; they extract the poisons from the air and render it fit for our use, and they pump up the water from the earth and send it down the valleys in cooling streams to give drink to the thirsty. "Were I a heathen, not knowing the true God, I would not worship the sun, as did the Peruvians, nor the stars, as did the nations of the East, but would bow in adoration to the trees and herbs of the field." Why not, in the absence of the knowledge of a higher power, worship that which provides my wants and pours out its many luxuries to meet my desires—by which or through which we may almost say we live and move and have our being.

But in the beginning man was given dominion over the sea and over the land, and all things contained therein. "God said, behold, I have given you every herb bearing seed which is upon the face of all the earth, and every tree in the which is the fruit of a tree yielding seed; to you it shall be for meat." Like every other gift of the Creator, however, they are ours to improve. He always gives us elements from which we must develop their possibilities. He furnishes the materials; we, by patient study and consummate skill, must learn how to use them. He gives us organs of speech, but long and careful training alone renders the human voice vocal with song and stirring with eloquence. He bids the wild lightning exhibit its terrible speed and power in the sky, but the labors of a Franklin and a Morse were needed to make it tamely and obediently comply with the dictates of man. So the original potato was planted in the soils of Peru, a somewhat bitter, scarcely edible product, from which the world-renowned vegetable has been propagated through the agency of man. The diminutive original of the cabbage, growing wild upon the shores of old England, without a sign to hazard a prediction of its after value, has gathered up its juicy leaves under the fostering influences of culture, and now yields, far and wide over the surface of the earth, its highly prized substance. As it were but yesterday, was developed a more wonderful product from the trees of tropical America and Asia. For ages the trees from which India Rubber and Gutta Percha are obtained grew and flourished, yielded their products and perished; thus generation after generation of them passing away before they became in the least serviceable to man. In 1770 Dr. Priestly refers to the rubber as a substance which had just been brought to his notice as admirably suited for rubbing out pencil marks, and as selling at three shillings sterling—just about a dol-

lar in our currency—for a cubical bit of half an inch, and the record of this first simple use we still have in the name—rubber from India, or India rubber. But it was not till 1839, only thirty years ago, that Mr. Goodyear, of New York, gave it to the world in its present protean form. To-day, to what myriads of uses it is put! Varnishes, paints, tubes, hose and pipes, shoes and clothing, railroad carriage springs, flexible joints, dishes, toys, combs, furniture, beds, tents, traveling bags, covering for submarine telegraph wires, etc., an array of uses such as never fell to the lot of any vegetable product, woody fiber alone excepted. It was a Goodyear in more than one sense that gave to us a new substance of such rare value. The world can well afford to remember the name found stamped upon all these goods, and the time well known as the good-year in invention.

But let us look further. The hnndreds of the varieties of wheat, both winter and spring, have, through man's agency, all sprung from one species. See the differences. There is the white chaff and red chaff, the bearded and bald, the early and late, the strong wiry stems and the soft and flexible, the large grain and the small, the dense compact head and the long loose one, the varieties liable to rust and others subject to the attack of insects—yet all were created alike. It is said that all the varieties of the rose came from fourteen species, every one of which had single flowers and very little fragrance. Behold again the dominion of man in the petals of the rose. The apple, of which there are estimated 1,000 varieties cultivated in the United States, are all from one plant—the apparently worthless European crab. The 200 varieties of peaches likewise originated from one species in Persia, their differences wholly due to causes exterior to themselves.

All these illustrations, taken at random from the innumerable number that present themselves upon every hand, are a kind of bird's eye view of the undisputed dominion of man over the forms of the vegetable world. They clearly show us that long culture and well directed care completely and radically changes, so far as their value is concerned, the elementary vegetable forms which the Creator in the beginning planted upon the earth.

The particular methods of producing desirable changes must be in the main passed by in this paper, having been so fully and ably discussed in other parts of this lecture course. Some of them are brought about by simply making the conditions under which growth takes place, more favorable, and is only a change in degree, not in kind; while others consist in interrupting the natural functions and producing vegetable monstrosities. The primary end and aim of all plants is the production of seed by which its species may be perpetuated. It is for this the vine, by spiral coils, lifts itself above the damp earth into the life-giving sunlight; it is for this the oak strikes its roots deep into the earth, and spreads out its ponderous branches bearing their immense load of leaves. Now if the seed is the valuable product, as it is in wheat, corn and beans, we must strive to increase the natural development of the plant, to furnish it an abundance of proper food, to assist it in every way in its natural career. But to develop extraordinarily any other part of the plant, we must resort to checks, to local stimulations, crosses, modified *influences* in the circulation of sap and assimilation of food.

Nearly all of our orchard and garden fruits belong to this class, hence the necessity of pruning, grafting, hybridizing, etiolating, and the like, all processes well known to our practical fruit growers and gardeners. It is the juicy pulp of the apple, the melon, and the gooseberry, that we value so highly, but this is never produced to a great extent by the plant in its natural state, and it is here that man has achieved some of his greatest triumphs over the vital forms which it has been given him to control. He has given the tints and fragrance to the rose, the nectarine juices to the fruits, the starchy fatness to the roots and subterranean stems, has made the barren fruitful, and the waste tissues to lean with the fullness and richness of their products.

It must not be supposed, however, that man's dominion over nature is not limited, and that because he is made a ruler he is therefore an absolute monarch over his passive vegetable subjects, for in his authority he is, and must eternally be, governed by a constitution and by-laws written out by the finger of the common author of both. Some plants utterly refuse to give up to the will of man any of their time-honored characteristics. The wheat seems perfectly willing, when properly appealed to, to dispense with the awns or beards which tassel its head; but the rye, equally ancient in origin, persistently holds to them. The potato gives up its bitter, somewhat poisonous properties, and humbly but richly ministers to our needs. The cabbage forgets its ancient worthlessness, but the dog-fennel persists in being simply and senselessly, it seems, dog-fennel still. Indeed, this is the case with most of our noxious weeds.

The technical name given to this disposition to change, under culture, is *sporting*, and plants that may be thus modified are said to sport; but there seems to be no sport about the thorn and thistle, which sprang up under the curse of the Almighty.

But even with those most obedient to man there is a limit beyond which they never go. Some eternal proclamation had been issued to them long before man had an existence, saying, " thus far shalt thou go, and no further," and the command, written in the secrets of their internal structure, has come down with them through the ages, and must go with them to the end of time. The rose, though bearing its thorn, never becomes a thistle, the apple never gives up its individuality and assumes that of the peach or the pear, and, though hundreds of voices and pages of testimony to the contrary notwithstanding, wheat never becomes chess, or cheat, as it is sometimes called. Not that experiment has alone proved this fact, but that the fundamental law of its existence forbids it.

Different varieties, species, and even genera, may be grown together in such a manner that the new plant, called a hybrid, shall partake of the characteristics of both. Many flowers, hot-house and garden plants, are thus originated, and seemingly new species established, but all such plants are unstable in nature, and exhibit a constant tendency to revert back to the primary forms. But the principle has its uses. From flowers of different colors is produced one having both tints, becoming what we call variegated. In the same way fruits and the other vegetable products are modified. A knowledge of the fact will also teach us to avoid such results as are not desirable.

Plants of the same nature must be grown so far apart that the pollen grains, that fine dust from the center of the flower, from the one shall not reach the other. All must have observed how corn of different varieties, planted side by side, mixes upon the ear. The powdery dust from the tassel of one variety falls upon or is carried by the winds to the silk of the other. This latter consists of hollow tubes, each one of which connects a rudimentary kernel with the outer world. The pollen grain falling upon this outward end bursts its spherical covering, and stretching out its inner integument to accommodate itself to its task, descends the long silken channel, and by its union with the embryo grain prepares the way for the fully developed kernel, having the color, size, etc., of one or the other of the varieties. But without this union nothing is formed but the worthless watery sac, which we sometimes find upon the cob. In some plants, when useful products are thus obtained, the varieties are perpetuated by cuttings and grafts, but the seed, if any are produced, which is not always the case, soon give plants possessing the characteristics of one or the other original kinds.

Another element in plant growth, already spoken of in this course of lectures, which, contrary to the prevailing opinion, undoubtedly baffles the power of man. It seems to be a common belief that plants coming from warmer regions may, by continued growth, become adapted to our more vigorous climate. Instances are cited of plants which were grown only in hot-houses at first, and afterward found to succeed in the open air, but it should be remembered that, though coming from a warmer latitude, they may not require more heat, and that had they been tried first, would have succeeded just as well. Plants growing under a tropical sun may still be alpine in character from the altitude they occupy. A plant from Southern Africa was introduced into England some years ago and found to succeed only under cover of the hot-house, but a specimen was accidentally thrown into a garden pond and continued to thrive very vigorously. The result did not, as was thought, prove that the plant had become acclimated, but simply that its roots had penetrated deep into the water, which was fed by springs. From the testimony of many close observers, it appears that each kind of plant bears a certain range of temperature, the limits of which cannot be extended by man. Varieties certainly may be secured better suited to the climate, but always at the hazard of losing the valuable properties of the original, for which alone we care for its permanence.

But with all the changes man has wrought in the vegetable world, he has still an infinite task before him in the same direction. The number of plants which now directly furnish us with food or clothing are but a few hundred, while the total number of known species of plants, to say nothing of varieties, amount in all to more than 120,000. Who believes we have found out all their useful properties, or have realized all of their highest possible development? What has been done, and especially in the last few years, forbids such a belief. Something like a century and a half ago, a man by the name of Herd found a peculiar kind of grass growing in the swampy lands of New Hampshire. He procured the seed and began cultivating it for hay, for which, we were told last week, the grass stands eminently foremost in the

order of plants first in value to man. Out in the valleys of the Rocky Mountains grows wild a kindred species of the same grass, softer in texture, not tending so strongly to the formation of woody fiber, and apparently better adapted by its thick growth of base leaves for pasturage. Who knows but our valuable timothy or Herd's grass is to be surpassed by this rival brother? Growing along with it is a species of flax, having apparently all the valuable properties of our field product, and of nearly double the size. Who, again, shall predict what shall be the future of this plant, and of the tens of thousands yet to be brought into use? Who shall teach us to more successfully manage those we already have, in improving their fruits, in avoiding or curing their diseases, in discovering new economical and medical uses? This is the final application of the knowledge received in the study of botany. This is the goal to be reached toward which the science is continually pointing. Like the diamond, it is treasuring up the light gathered from the pointed spires of leaves and shining through irradiated cell structures, and is pouring it in burning lustre upon the pathway of our investigations.

Professor Chadbourne says, to accomplish all we wish and all we expect in bringing the vegetable world to render its riches more abundantly, we must undoubtedly call to our aid the kindred science of chemistry. But here is the great storehouse of materials. * * * * All animals, man included, are so constituted that they cannot subsist upon inorganic elements. We may analyse our food, determine its exact composition, but it will not enable us to feed on minerals. We may prove with all the science of a Liebeg that charcoal and air and water contain all we need, but we know they would form poor fare for our tables. We may call in the aid of chemistry, with all its power, to produce transformations—give it a magazine of the pure elements, and it cannot furnish us with a single grain of starch nor crystal of sugar, nor anything to be a substitute for them. The plants are the only chemists that can take up these inorganic materials and in the wonderful laboratory of their living tissues mould them into forms to support animal life. * * * * We can hardly over estimate the importance to our country if all our young men who travel were so vested in science that they should be able at once to detect the valuable properties of plants and their habits, that all capable of introduction might be secured at once. A single plant might repay for all the time and labor of every American student in this department. But if men are never trained they do not observe, and if a strange plant is forced upon their attention they know so little that they can determine nothing of the prospect of improving its qualities by cultivation, if ever of cultivating at all. If all those who labor among plants, and have opportunities of introducing new, were well versed in botany as it is now understood, this source of wealth would be vastly increased in a single year. The progress would be rapid, the quality would be improved and the number would be increased. Useful plants would take the place of those useless or noxious. Our forests would be better preserved, and new forests would be springing up. Millions of acres, barren and dreary, might be gradually supplying our waste trees if men would learn that forests can be planted, and

were imbued with that spirit of improvement, and care for coming generations, which science has ever had a tendency to produce.

It may be said, with truth, that much of the work already done has been done by those ignorant of science. These results have been the slow accumulation of the ages; we wish now more rapid progress; the times demand it. The same is true of every department of human industry and source of wealth. Discoveries in olden time were accidental. The alchemists in the dark ages, with their alembics and crucibles and chemicals of mystic names, worked by chance, and by chance, from time to time, made some valuable discoveries. But how different is the work of a modern chemist. A thing is to be done, and he is able as once to bring to bear upon the problem all the principles of that wonderful science. Every experiment is performed for a definite purpose, and accidental discovery is the exception, not the rule. So in mechanics, a result is to be reached, and the problem is attempted by well established principles. Those wonderful looms that ply their iron fingers to weave our carpets, were not a chance discovery by Bigelow, they were an invention, reached only by long continued systematic study. So of the discoveries and the improvements in the vegetable kingdom in our day. They must not be left to chance, but be sought under the guidance of science, where alone the course is direct, the progress sure and rapid.

We have attempted thus far to indicate the importance to us all, and especially to the agriculturist and horticulturist, of the study for which we are contending. Let the attention now be turned to some of the special lessons which it teaches. Like every other science, its first great work is to classify and give names. History shows that this has been the chief work in the past; and, it may be added, in no department has there been greater problems to solve, or greater triumphs achieved. What wonder that, with 120,000 species, in their multiplied forms, the task has been long in its accomplishment and herculean in its requirements. From the days of Solomon to the present time, earnest men have been contributing their industry, their investigations and their talents, to this one end. System after system has been advanced, zealously advocated, thoroughly tested, and abandoned, to be superseded by another, destined to share a similar fate. Thus the work went on, groping in the darkness, but struggling for the light. At last, about the year 1682, a luminous *Ray*—a man by that name—came to the aid of the investigators, and the foundation of our present classification was laid. Let us not imagine, however, that this preliminary work was done in vain. To form any valuable classification, a very extensive knowledge of the kinds, structure and habits of plants was absolutely essential. This knowledge, obtained by the rivalries of original and diverse plans, became the building materials from which the goodly structure has now been reared. But man has found that it is not his business to invent schemes of classification, the work having been done in the beginning of time. He is but to read in reverence the handwriting of the Almighty. The seals of the book of nature have been broken, and the broad glittering page, with its exquisite touches of beauty and wonderful revelations, spreads out everywhere to those who will read the story of the creation. It is true that we do not yet always interpret correctly,

neither can we expect to till our knowledge of the vegetable world is complete and perfect; but enough is already known to make our progress in this direction sure, and to give us a clear insight into the mysterious works of their infinite author.

The differences which we observe in plants have been caused in one or two ways. Either all forms were created alike, and have by insensible shadings, due to kinds of food and other external influence, gradually changed in character, so that in one instance we have an oak, and in another a pine; or they were created different, and have, by constant reproduction of themselves, remained true, except in slight variations, to their original types. Common observation always points to the latter, but is it not strange that scientific men are divided upon the question, and are to-day waging war upon each other in hot debate and severe criticism. But let the matter be settled as it may, the lasting value of our classification depends upon the idea that species are permanent vital forms, absolutely unchanging in time beyond a certain limit, and recognized everywhere as belonging to the same family of individuals.

A species may be defined as the entire collection of plants of one kind that have descended from the same parent stock. They will therefore agree in all essential particulars. The properties of one are the properties of the whole. And so we find it in nature. A single plant is found to be poisonous, and immediately we conclude that every other plant of the same essential character is also poison. If one is found to have strong fibrous bark, its kind may be examined everywhere, though continents intervene, and find the same peculiarity. Species, then, are the true subjects of classifications, but the work does not end with them. While they are separated from each other by clear and definite distinctions, several of them are found to exhibit striking resemblances to each other, as if originally modeled upon the same plan. Thus we arrive at the idea of a genus, which is a collection of allied species. Again, upon still broader natural characteristics, genera are grouped into orders, these in turn into classes, the classes into sub-kingdoms, or the primary divisions of the kingdom of plants.

The work of making out a classification has, however, in the main been accomplished. We can hope for but little more in this direction. It now remains for us, as students of nature, to use it to assign upon examination the various plants about us to their proper places in the system. To do this will require an intimate knowledge of the structure, forms and habits of every specimen we examine. We are not only led but compelled to observe closely. We must watch the tiny seedling just bursting from the earth, and follow it carefully in its processes of flowering and fruiting; we must dissect its parts, and, with microscopic vision, note its structure; we must, by the taste, or chemical tests, find out its properties, and seek to pry into the mysteries of its life.

The system of classification, therefore, not only hangs out, as it were, a label upon each plant, as a true guide to the knowledge of its whole species, but stimulates thorough investigation into the structure and life of plants. This brings us to the province of Physiological Botany, in which the great

work of our day is to be done. Here are mighty problems yet to be solved, respecting the conditions of growth, the direct food of plants, the influence of sunlight and heat, the means of securing more bountiful harvests, the modes of increasing new varieties, the finding out of new uses for those we have, and the general influence of vegetation upon the economy of nature. But so much has already been said upon these topics, and to be said under special heads hereafter, that they are in this paper omitted, save one statement from Dr. Sewall, in regard to the influence of vegetation upon climate. He says:

"Tell us how much water the leaves pump up. Let me say here, I do not mean the water that evaporates from the leaf, as it would from a wet shaving, but how much it actually pumps up. It has been demonstrated that every square inch of leaf lifts three five-hundredths of an ounce every twenty-four hours. Now a large forest tree has about five acres of foliage, or 6,272,640 square inches! This being multiplied by three five-hundredths, (the amount pumped up by every inch,) gives as a result 2,352 ounces, or 1,176 quarts, or 294 gallons, or 8 barrels; a medium sized forest tree about 5 barrels; the trees on an acre 800 barrels in twenty-four hours. An acre of grass or clover, or grain, would yield about the same result."

I have made a calculation of the amount of water lifted from the great Amazon valley. * * * * Here is the result of my arithmetic—974,328,-972,628 barrels, 23 gallons, 3 quarts, 1 pint and a fraction. I suppose a professor of mathematics would have told us the exact fraction, but this is near enough, perhaps.

The great treeless plains are rainless, except when a foreign shower visits them. On the plateau of Bolivia it never rains except when the great Amazon valley sends up its surplus waters over the eastern Andes. The vast desert plains of the West afford another illustration of this fact. Regions cleared of forests are always drier, the streams smaller, the rains less frequent. Not only does the leaf pump up water, but all the inorganic matter. The mineral matter of the earth, dissolved by and in the water, is lifted into the tree, and the water is lifted into the tree, and the water evaporating leaves the mineral or ash in the wood. Now the ash in the oak tree amounts to three per cent. of the entire weight. A large tree weighs seven or eight tons, an ordinary, medium sized forest tree weighs five tons; in such a tree the leaf has lifted three hundred pounds of solid earth. Surely the leaf has an elevating influence; it brings earth nearer heaven!

A new field of labor is also opening before the student of botany, that of the vegetable diseases. Perhaps nothing pertaining to plants is so little understood; but the importance of the study and the increased facilities of late years for microscopic observations, will undoubtedly call more attention to the subject. Cold, damp soils, sudden changes in temperature, excessive heat and drought, the attacks of insects and parasitic plants, are among the fruitful sources of disease. So far as observation has gone, it is pretty generally believed that the parasitic fungi are not in the first instance a predisposing cause of disease or decay; but it is known that they materially influence both, after causing great loss and alarming destruction. The spores or germi-

nating particles of these plants are so minute that they readily float invisible to the eye in the air, and being very tenacious of life, await with perfect composure a favorable opportunity to germinate and grow, which they do with astonishing rapidity. Doubtless all have observed, upon wet days, a jelly-like formation on old leaves, decaying wood, and other substances. In some cases this forms so fast that it is popularly believed to have fallen from the clouds. A gentleman in Australia was, when descending a hill, overtaken by a sudden shower, and upon his return found the hill-side so slippery, by this fungus or algoid growth, as to render his descent in safety quite hazardous. We are often astonished at the rapidity with which fields of wheat are attacked by rust, the value of the crop being sometimes totally destroyed. This is caused by a fungus called *Uredo Rubigo.* It forms yellow and brown oval spots and blotches upon the stem-leaf and chaff. The spores burst through the epidermis and are dispersed as very minute grains. Henslow has shown by experiment that if the diseased seeds of wheat be steeped in a solution of sulphate of copper, they will not produce diseased grain, and that the sulphate of copper does no injury to their germination. The solution used is one ounce of the sulphate of copper to a gallon of water, for every bushel of wheat. It is believed that the spores are contained in the seed from the disease of the previous year, and that should the plant meet with nothing to prevent its vigorous growth they would never be developed, but are ready at any time to seize upon their victims if a favorable opportunity presents itself.

As a rule, fungi are never found upon perfectly healthy surfaces. Mildew is a disease caused by a fungus denominated *Puccinia graminis.* The ripe spore-cases of this plant are small dark brown club-shaped bodies, their thicker ends being divided into two chambers, each filled with minute spores, and their lower ends tapering into fine stalks. The clusters of spore-cases sometimes burst through the epidermis, or skin of the plant, in vast numbers. The minute spores seem to enter the plant by the stomata, or air openings in the leaf. In the vine a kind of mildew is traced by Berkely to the attack of a fungus called *Oidium Tuckeri.* For this disease sulphur and the pentasulphide of calcium have been recommended as remedies. Smut spurred rye, the potato disease, the rotting of fruits, and the decay of wood, are all, with many other vegetable diseases, believed to be the result of fungus plants. Ring-worm in our bodies, according to Dr. Fox, is produced by the spore of the fungus which causes the disease getting into the hair follicle, reaching the root and being carried up into the body of the hair. Intermittent and miasmatic fevers are now believed to be due to the same forms of vitalized beings.

But there is still another element in this study of botany, of direct bearing upon our agricultural and other rural pursuits. We are all ready to admit the importance of these avocations. We hear them lauded in sounding terms in public addresses. Their praises are upon the lips of many at our agricultural fairs, and in theory we all agree with the wise man, known to all, who said "Agriculture is the noblest pursuit of man." But, much as we believe in all this, and much as we desire to cherish such a feeling among men, know-

ing that the nation's wealth depends upon it, what do we really find in practical life to-day right here in the shadow of our University. Go yonder in the towns and country round about, and inquire of the young men what they propose to make the business of their lives, and listen to their replies. Hear them talk of law, and medicine, of trades, of civil engineering, or getting an education with a vague idea of being able to do something afterward, while a few out of the many choose the farmer's life. With parents it is not quite so one-sided, but after all, how many among those who labor themselves are there that would not rather have their son become an eminent lawyer, or a wealthy merchant? Now this should not and need not be.

It is not because these occupations are not healthful, for the testimony of all time is to the contrary. It is not because they are not honorable, for among all the pursuits of man they are the most legitimate. It is not because they do not pay, for, with proper culture, nothing offers greater inducements in this respect than our rich prairies. It is not because the labor is greater, for men are every day leaving them for more laborious and harrassing pursuits. It is and must be because the brain is not called into action as well as the muscles of the arm. Let a man have the opportunity of engaging in a pursuit which obliges him to think, and he will not dig potatoes for you with a hoe for the same price. The engineer will clear the way and mark the route, with excessive toil, for a railroad, but will scorn the offer of more money, if such should be the case, for shoveling sand, though his hands are equally soiled and his cheek equally bronzed. The pickax becomes a very different instrument in the hand of a geologist from what it is in the hand of the common stone quarrier. We do not say that farming and orcharding do not require thought, far from it, for they do require and are receiving the closest thought of many of our ablest minds, and in our day more than ever before; but the curse of the employments is that the large mass of those now engaged in them, who are thus searching after other means of making a living, are never trained to think. Things grow up around them in obedience to some unknown law, over which, they imagine, if it even occurs to them at all, they have no control. They do not and cannot see the need, nor the opportunity, of exercising so much brain power, and, to them, mysterious learning. But let the light of that learning shine in upon them, that they may see there is a reason, within their comprehension, for almost every change that takes place about them, from the growing and pointing of a leaf to the prolonged drouths of summer—not a mere matter of guess work, founded upon speculation, but resting upon the broad foundation of undeniable truth; and we shall find these pursuits in practice where, as they ought to be, we now know them in theory, and as they are represented in our high-toned, public-spirited addresses.

Now the teachings and problems of Botany, in its broadest sense, embracing every possible scientific inquiry about plants, whether of the forests, the grasses, the fruits, or the microscopic forms which infest the earth, the air and the water, will furnish him who lives among and by the products of the vegetable world an exhaustless source of pleasurable and profitable investiga-

tion, of close inquiry and of deeply-penetrating, far-reaching, wide-comprehending power of thought.

May the time speedily come when this University—not by teaching one science alone, but all the departments of learning pertaining to the industrial pursuits of man—shall infuse into the very life blood of these callings this inspiring, manhood-developing power. Then shall the best interests of agriculture, horticulture and the mechanic arts be most enhanced, but not these only, for man himself will rise as man and be crowned with power and dominion above them all.

DOCTOR WARDER'S LECTURE ON PROPAGATION BY CUTTINGS.

In a cutting the buds are the important parts. The cutting has a number of buds, and is about twelve or fifteen inches long. We cut some distance from the upper bud, while the cut below is close up to the bud. The wood above sometimes dies back to the bud. In this instance (showing a cutting) we have five buds. The reason we cut near the lower bud is this. The bud is the point of vitality, and the nearer we can approach that the better for the development of the cells. Cut with a sharp knife or shears. Mr. Henderson, who has written that capital book "Gardening for Profit," finds that it makes no difference where you cut, and you may cut in the internode with success, especially in green cuttings. The callus will take place and the roots strike at the end of the cutting.

Many of these green cuttings may be grown out of doors, if put in a shady place, on the north side of a fence. The green wood cutting, used out of doors, requires to be a little further advanced than when used in the green house. In the green house we control the bottom heat. Hot water pipes are used for this purpose. The boiling process keeps up the circulation.

In striking cuttings it is important to keep the sand in which the cutting is placed at a more elevated temperature than the air. This encourages the formation of roots. If the top buds shoot before the formation of roots the cutting will die. You cannot put them out of doors until the soil is warm. It must always be recollected that at the base of these buds there are undeveloped buds, and that the preference is given to what are called "Hammer cuttings." We used to get one dollar per thousand more for those thus selected. It is not necessary to cut them twelve or fifteen inches; often we cut six inches, and we even cut to one eye with success. The single eye is found sufficient. In cutting to a single eye we use artificial heat, as a general thing. The radicals are not confined to the base of the cutting, but will be thrown out at every bud below the surface of the ground. [The lecturer illustrated on the board the different methods of propagating cuttings.] Now these remarks refer to the propagation of grapes more particularly. Some plants are difficult of propagation, and some not so difficult are easier reached by planting the seed.

The apple tree will grow cuttings, but it is not usual to grow the apple from cuttings, because we can get the tree easier by planting the seed and grafting. The current is easily propagated from cuttings. The gooseberry

is propagated in the same way. It is only when we want a new variety that we plant the seed.

The French method of growing cuttings is to bring both ends in contact with the earth. But there is no advantage in this.

PLANTING THE CUTTING.

For this the ground must be put in fine condition. Plow and trench-plow, and thoroughly pulverize. Now suppose your cutting ten inches long—perhaps the usual length. Cut a trench, and place it so that the top of the cutting will just come to the top of the soil, in a standing position. Now introduce fine soil, and tramp down at the base of the cutting. Set two, three, or four inches apart, and give clean culture, or, as is the practice of some, mulch. [The Doctor explained the method adopted by a Mr. Griffith, and upon which he has a patent.] He waits until the ground is warm, and then puts in his cuttings, and mulches with sawdust or other material. The object was to warm up the soil below, keeping the surface cool, in order to give the plant a chance to strike its roots before the bursting of the bud below. Mr. Griffith, in this way, is very successful in growing plants from single eyes, getting, sometimes, two plants from one eye. When asked how many plants he expected from a setting of ten thousand, he said, "eleven thousand!" so great was his success. It should be always remembered that it is not the precise degree of heat or temperature that is needed for the successful development of the cutting, but the comparative degree of temperature between the roots and the top buds.

ANATOMY, PHYSIOLOGY AND ECONOMY OF PLANTS.

BY JOHN H. TICE, RECORDING SECRETARY OF THE MISSOURI STATE BOARD OF AGRICULTURE.

The subject selected is vast in proportions and comprehensive in extent. So vast and comprehensive, indeed, as almost to preclude the possibility of giving, in a single lecture, an intelligible statement of even one of its three subdivisions, much less of its whole. You must not, therefore, feel disappointed if many of the points that will loom up in the discussion are not presented in all their minute details. Time and the occasion necessarily restrict us to the discussion only of general principles.

Plants, in the order of creation, preceded animals; and, in the order of habitation and settlement of the earth's surface, always precede or accompany them. The limits of inhabitation, for either man or animals, are, therefore, inexorably fixed by the limits of vegetable growth. Why are the deserts of Central Asia, and the Great Sahara of Africa, uninhabited by animals? Because no vegetation is there to sustain animal life. And, if ever they will be inhabited, or inhabitable, it will be when man, in the progression of the arts and sciences, will acquire the knowledge and skill to make vegetation grow and flourish there. Plants are the connecting link between the animal and the mineral world. Animals cannot live on inorganic matter. Exposed

where only surrounded by minerals, they must perish, because they have no power to assimilate them, and therefore no ability of being nourished by them. But plants, fixed by their roots to the earth, decompose, by galvanic action, mineral substances found there, and absorb what is their proper food, which, under the influence of light and air, is converted into different vegetable compounds, serving for the food of animals. Then come animals, and feed upon the organized matter that plants have elaborated from the soil and air.

But, if animal life depended solely for subsistence on the vegetation spontaneously produced, the earth would not nourish and sustain one-millionth part of the animals it is capable of sustaining. Hence human skill and science are necessary to take control of vegetable life, and to so direct it as to contribute to the utmost extent to the multiplication and sustenance of animal life.

Man has availed himself largely of the forces of nature, and after subjecting them under his control, has directed them mechanically to subserve the purposes of life. In the great future he will avail himself to a still greater extent of them, and by them will effect purposes not now even dreamed of. But how has he availed himself of cosmical forces to carry on his mechanical operations? By studying their nature, and ascertaining the laws that operate through and by them.

What was true in the employment of wind, water, steam, electricity, magnetism, or any other force used by man as a motive power, is true, and must be complied with, to avail himself of any other forces laid up in the great magazine of nature for his use whenever he has demands for them. And since the primary dependence of all animal life, either for multiplication, extension or sustention, is on an abundant supply of vegetable productions, the study of the anatomy, physiology and economy of plants, is one of primary importance. For man cannot control and direct to the attainment of the highest results, vegetable life, unless he knows the laws by which, and the conditions under which, it operates. I shall, therefore, treat as briefly as is compatible with intelligibility, the subject, under the following three heads:

Firstly. Vegetable anatomy, by which I mean the analysis of the body of plants, so as to determine their organs and general structure.

Secondly. Vegetable physiology, or a description of the functions of the different parts or organs of a plant, and the offices they perform in its individual economy.

Thirdly. Vegetable economy, or the regular operations of nature in the generation, nutrition and preservation of plants.

I. VEGETABLE ANATOMY.

Every plant, or animal, originates from a single primary cell. Anatomically, a cell means a little sack or bladder, filled with fluid. As organic cells are so extremely minute as generally to be invisible to the natural eye, that you may comprehend what is meant by the term cell, I will state that the

›artments of a honey-comb are called cells. Similar are the cells in or- : tissue, only they are closed on all sides. If a minute particle of wood aved off and placed under a powerful microscope, it is found to be honey- ›ed with cells. They are so small that in a cubic inch of wood there are ı one and a half millions of cells. Whatever the form or size of an ani- or tree, it is all evolved by gemmation from a single cell. Each cell, gh not differing externally in size or form from thousands of others, yet governed in its budding by a *sui generis* law, that it always evolves and ›duces the form and symmetry of its parental type. Men have sought deur, the beautiful, wonderful and sublime, in scenes where nature ope- l on a grand scale, producing an Andes or a Niagara ; yet what are the es but an amorphous pile of matter, passively upheaved by a subterra- force? And what is Niagara but a passive mass of liquid matter obey- ;he cosmical force of gravity, and tumbling over a precipice? How does ›r compare, in the wonderful, with a little cell, filled with a vital fluid, :h buds in regular order into other cells, in such places, and in such num- , as in time to evolve, in all its beauty and loveliness, the original paren- :ype?

he substance constituting the cell walls is called *Cellulose.* It is composed he same elements, and in the same proportions, as starch. Starch, indeed, as to be the primary substance out of which all the cellulose group are ıed. Starch, Cellulose, Inulin, Dextrine, Bassorine, vegetable mucilage, Metarabic acid, are isomeric bodies ; that is, they are identical in compo- ›n, though different in properties. Their composition is expressed by the nical formula, C 12, H 20, O 10. In starch we have carbon, hydrogen oxygen, the three most important elements, as far as quantity is con- ed, out of which plants are constructed.

ll the ternary compounds, such as gum, jelly, cane and grape sugar, oil, ı, wax, tannin, etc., are compounds of various proportions of these e elements. The fourth element is nitrogen. It forms quaternary pounds, in which the four elements are combined in various proportions. ›r analyses have shown that most of these bodies are not purely quater- ', but quinary compounds. The fifth element is sulphur. Albumen, ch is transmuted starch, seems to be the basis of these quinary compounds, tarch is immediately of the cellulose group. The white of an egg is the iliar form of albumen. From it spring the albuminoids, such as fibrin, in, gluten, gliadin, mucedin, etc. The albuminoids are sometimes called ;ein compounds; the term protein, in Greek, signifies to take the first ›e, or the highest rank, and was adopted to show their physiological im- ;ance in the structure of bodies. It must, however, be borne in mind that ;hese bodies are merely advanced stages towards growth and nutrition of ch, transformed by the action of plant life.

ut protein, when found in the cells, has received the name of proto- ım, meaning first formed. It lines the inner walls of the cell, but does fill it, and apparently is the active agent of transforming the other con- s of the cell into organizable matter.

Protoplasm, or the formative substance, is a granular, gummy, azotised fluid, found gathered around the nucleus, or cytoblast, of the cell and its walls. It does not mingle with the other fluid contents of the cell, but possesses a visible stream-like motion, flowing upwards and downwards through them within the cell. The fluids proper of the cell apparently remain passive, while the protoplasm, in transposing the elements present in the cell, is constantly undergoing changes, If the motion were not life itself, or rather the evidences of life, we might conclude that it originated and depended upon the reciprocal action of the chemical elements of the fluid. It unquestionably is vital action, and may be sustained by the chemical, or perhaps galvanic, action, reciprocally of the nucleus (that is cytoblast) and the cellular integument, since the spiral current is always from the cytoblast to the cell wall, and returning from the latter to the former; the nucleus, in other words, is the centre of the motion.

THE CYTOBLAST.

The nucleus, or cytoblast, is a round, but sometimes also oblong, and generally flat, small body, with a sharp edged circumference, occupying the center of the cell. Mostly it is as transparent as water, filled with a very minutely granulated substance. In time, within the cytoblast may appear one or more nucleoli, or minute cytoblasts. New cytoblasts, for future cells, are formed either independently or by division. When formed independently, it seems to proceed from the protoplasm manifesting itself as a nucleolus, around which an integument soon forms. When the multiplication is by division, the original round cytoblast elongates, and soon a segmentation takes place, and instead of one two nucleoli appear. In the division of the mother cytoblast, the protoplasm plays an important part.

FORMATION OF CELLULOSE.

We now know what an organized cell is, and how it multiplies the nuclei for the formation of new cells. We have already seen that the integument of a cell is cellulose; and cellulose, by chemical analysis, is found to be identical in composition with starch. In the point of appearance, the albuminoids and all the protein compounds, stand between it and starch. It therefore has passed through all the intervening metamorphoses.

Cellulose is now generally supposed to arise from the outer hardening of the protoplasm. Its subsequent thickening is formed by alternate layers of hardening protoplasm; and, its alteration is supposed to be due to the chemical, perhaps galvanic, action of the protoplasm and elements present in the cell.

The formation of new cells always proceeds from the interior of an already existing one. The cell in which a new one is formed is called the mother cell, and the new ones, in relation to each other, are called sisters, but in relation to the mother cell are called daughters. When but a portion of the contents of a mother cell is consumed in producing new ones, it is called free cell formation; but, on the other hand, when the whole contents of the

mother cell divides into many parts, and a cell springs from each subdivision, it is called cell production by division. In both cases the cytoblast is formed first, and a new cell then incloses it. By free cell formation the mother cell endures as a permanent part of the structure; but when cell formation proceeds from division the mother cell vanishes, its integument sooner or later dissolves, and is consumed in forming cell membranes for the daughters. This latter species of cell formation is universal as to grains of pollen and the sporangia of the cryptogamia.

GROWTH AND NOURISHMENT OF CELL MEMBRANES.

The original form of a young cell is subject to many transformations by the mode of its nourishment; for, naturally, with the growth of the contents the cell membrane grows also. When the cell extends itself equally in all directions, it acquires size without changing its original form. On the contrary, when it extends itself more in one direction than others, or if certain points on its periphery extend themselves predominantly, with its increasing size, it also changes its primitive form; and the diversified forms in which cells exist accord with the manner in which the cell membranes extended themselves. The growth of a cell is, however, often restricted in its freedom by neighboring cells. Its form then more or less subordinates itself to the existing cells. This is the case in all those tissues where the cells are compactly placed. The thickening of the walls, and the finally closing up of the cells is effected by the continual deposition of cellulose layers upon the inside of the membrane. The inmost layer, is therefore, always the youngest.

COMBINATION OF CELLS.

In only a comparatively few cases does a plant exist of a single cell—only in some fungi and algæ. On the contrary, in the higher plants the structure is a combination of several varieties of cells.

Cells can be classified into like and unlike. When like cells are united, we call the combination cellular tissue. But when unlike cells are united, we call the combination vascular tissue. Cellular tissue can be subdivided into wood tissue, bark tissue, bast, pith, foliage, etc.

The compound known under the general name parenchyma, is understood to apply only to the cellular tissue, as developed in the bark, pith, leaves, etc. By the vascular tissue is meant the combination of cells that are much, and sometimes indefinitely, elongated, and should properly be called ducts, such as convey the lactex or milky juice in the milkworts, the resins in coniferæ, etc. They are of varied structure, annular, spiral, cylindrical, etc. The cellular and vascular tissues are each united together by an intercellular substance, which is a transmuted product of the mother cell, and is the same as that which, on the surface of plants, is called cuticle or epidermis.

INTERCELLULAR SPACES.

Where the cells lie side by side, without being in contact at all points, there is a free space which is called an intercellular space. The more globu-

lar the cells, the smaller will be the superficial points of contact, and the larger the intercellular spaces, and also the more will the form of one cell be subordinated to another; and the more the walls mutually flatten each other, and the closer they lie side by side, the larger become the superficial points of contact and the smaller the intercellular spaces. The tissue formed of stellar shaped cells, therefore, has the greater intercellular spaces. These spaces generally are filled with air, and form in this wise a regular tissue of a more or less coherent system of intercellular passages, which discharge in larger air-filled spaces under the stomata or small orifices, also called breathing pores, in the leaves, or on the green bark of the stem.

In all tissue, while the cell-forming process continues, air is not found in the intercellular spaces; and in wood tissue the spaces are generally filled with the intercellular substance. But in those plants containing gum, resin, lactex, etc., the intercellular spaces are large and serve as ducts for these substances.

KINDS OF CELLS.

Cells can be divided into several distinct classes, according to their origin, the time of their appearance in the structure, as well as to their physical and physiological nature. The first general division is into free, and the second into combined cells.

To free cells belong the spores of the cryptogamia, and the pollen cells of the phænogamia.

To the combined or linked cells belong those named as constituting the different kinds of tissue already described. All cells that constitute an integral part of any structure, either of entire plants, as fungi, lichens, algæ, or parts of structure, as wood, cambium, bark, bast, etc., are combined cells. In the building of vegetable structure, the leagued, combined or linked cells play the most conspicuous part. Of these, the most widely distributed are the cells of the parenchyma.

PARENCHYMA.

The term parenchyma is applied to the substance constituting the cells of the pith, leaves, bark, medullary rays, etc. Parenchyma, like cellulose, is a mere transmuted production of starch. The cone or apex of any bud, whether of the seed, root, stem or axis, is always composed of it. Upon its presence depends the vitality of the bud, and consequently the life of the plant. Growth of a plant, in whatever direction, upward, downward or laterally, is an extension of parenchyma. The vitality of the parenchyma, or its power of extension, depends upon the presence of vibrionic particles in the extending cell. Viewed under a microscope, these vibrios have the appearance of bees swarming, moving rapidly in all directions on the apex of the fluid contents of the cell.

Both in the longitudinal extension of either the extending or descending axis, the structure is parenchyma, known under the familiar name of pith. The lateral extension, originating in, and radiating from, the pith, is known

as the medullary rays. The extension of the parenchyma thus produces the skeleton of the plant, on which all the other tissues form and build up its body. On the ascending axis nodes are formed, at which leaves develop, and generally a bud. The cells of the pith prepare the parenchyma for the development of the leaves, like those of the general structure do the cellulose for the cellular tissue. On the roots there is an analogous development, but no nodes or buds for new roots, and none to correspond with the leaves on the stem, unless it be the rootlets. These sometimes have been called spongioles, but the term is now discarded by physiological botanists.

The cells of the medullary rays, and those of the epidermis and bark, belong to the parenchymatous group. The medullary rays are seen in the radiating lines from the pith, through a cross section of wood, especially of oak. The rays are formed of compressed and often closed cells, that keep up communication between the interior of the stem and the bark, from the pith outward.

The cambium occupies the intermediate space between the wood proper and the bark. It is the last year's deposit of woody fiber, filled with starch, and endures only until the next annual layer is forming. The primary cells of the cambium layer spring from the secretions of the medullary rays, which seem to act chemically on the elaborated elements in the descending sap, transforming and fixing them as cambium. The cambium and the inner bark are main storehouses of starch and the azotized compounds, etc.

There is a distinction made between the cambium proper, which is a compact cellular and vascular tissue, and the cambium ring (*annulus cambialis*), which is a more open structure. The cambium ring is formed early in the season, as soon as vegetation commences. When the parenchyma in the cone of the stem, or of the radicle, begins to extend itself by growth in spring, the medullary rays similarly extend themselves laterally, pushing out, as it were, the bark, and forming new cells of mucilaginous matter on the outer surface of last year's cambium. It is on account of the delicacy of this structure that the bark so easily separates from the wood in spring and early summer.

The bark structure is not necessary to be analysed at present. I will, however, mention that portion of the outer bark which has a green envelop. The green matter that gives it this color is chlorophyl, and is the same that gives color to the leaves. The meaning of chlorophyl is leaf-green. In the leaf, however, it is not the leaf proper that has this color, but is the coating of minute starch granules, fixed to the interior of the cells, or floating in their sap, that gives the leaf apparently this color. The cuticle or epidermis has breathing pores (stomata), both on the stem and on the under side of the leaves, which bring the interior structure of the plant into communication with the atmosphere.

LEAVES.

The complete leaf consists of the blade and its petiole or leaf-stalk. The leaf might almost be said to be a thin layer of green bark, expanded horizontally. Like the stem, it consists of two distinct tissues, the cellular and

the woody. The cellular is the soft pulpy portion, the parenchyma, and only appearing green because of the immense number of starch granules in it, covered with chlorophyl. The woody portion are the ribs or veins of the leaf, which, like the woody portion of the stem, give firmness to the structure. The subdivision of these veins is carried beyond the limits of unassisted vision, so as to distribute to and receive sap from the minutest organs of the leaf.

The cells of the epidermis, both on the upper and lower side of the leaf, are placed horizontally and are very minute, sometimes small parallelograms, and consist but of a single layer. The cells under the upper epidermis are compactly arranged, and have their vertical diameter from three to five times greater than the horizontal. This layer consists of from two to four tiers of cells. Under and between these and the lower epidermis is a network of amorphous cells, arranged horizontally with large intercellular spaces.

I have now enumerated some, not all, but the most prominent, of the vegetable cells and organs, have described generally their development, and partly have indicated their function. The anatomy of the organic structure is now sufficient for our purpose. The organized plant is before us. It consists of two parts, the root and the stem. One forms nodes, out of which side branches may spring, and buds for continuing organic growth. The other forms no nodes, but new roots and rootlets spring from a peculiar development of the outer terminal cells of the medullary rays. The buds on the stem consist, however, of two kinds, the leaf or wood bud, and the flower fruit bud. From this I pass to the second division of the subject.

II. PHYSIOLOGY OF PLANTS.

The embryo of the future plant is nestled in the seed. The mother plant has stored in the seed lobes sufficient aliment, ready prepared, to sustain the plantlet in early life until it has acquired organs and vigor enough to take care of itself. Starch is the principal ingredient of the seed. But the embryo cannot digest starch until it is organized. "Strong meat for men, but milk for babes," holds good also in the vegetable world. The mother plant has therefore digested a part of the starch in degree, and a part completely, which latter is placed around the embryo, so that when the plantlet wakes up the food is within its reach. This is an introgeneous milk-like substance, called aleurone. Next to the aleurone stands the alluminoids; and between the latter and starch stands the albumin. They are all starch in different stages or degrees of digestion. If the seed has one seed-leaf only, it is said to belong to the monocotyledonous order of plants; if it has two lobes, to the diocotyledonous order. The function of the seed leaf is to act as digester of the starch until the store is exhausted and the plant organized. The embryo has two buds, and buds, we have already seen, consist of parenchymatous cells. The incipient development of these buds has received the name of germination. Warmth and moisture are necessary to germination. As a general thing, fresh seeds germinate sooner and more freely than old.

The seeds of many plants, if kept long, will soon pass the limits of germination. Coffee, for instance. Some seeds, like those of the maple, germinate as soon as favorable conditions supervene; others, on the contrary, lie some time in the earth, and generally do not germinate until the succeeding year. They seem to require time to become fully matured.

Germination is the commencement of cell formation at the apex of each bud of the embryo. One bud proceeds by pushing the ascending axis, the plumule, upward, to put it in communication with the light and air; the other, by thrusting the descending axis, the radicle, downward, to put it in communication with the water and alkaline salts of the earth. The plumule soon expands its leaves in the air, draws in life and vigor from the vivifying rays of the sun, rejoicing in its new being: It is now ready to be weaned, and be self-supporting. What are its means to effect this end? It has exhausted its store of food laid up in the seed lobes; it must, therefore, draw it from other sources, or perish. Whence and how does it supply itself? These questions will be answered when we treat of vegetable economy. All we can do now is to give the functions of its different organs, and the offices each performs in its individual economy.

ROOTS.

The roots, we have seen, put the plant in communication with the earth. They may be divided into two classes—first, the primary or tap root, which springs from the germinal cell of the embryo; and second, the secondary or side roots, springing from the sides of the tap root. As there are no nodes in the root, consequently it does not develop, like the stem, its branches from buds at the nodes. Branch roots, side roots, and rootlets, can spring from the sides of any main root at any point whatever. Nodes in the roots would be an impediment to the economy of the plant, for then only branches and rootlets could spring from buds at the nodes. The plant requires an organ at all points where the soil comes in contact with the roots, to gather food, which could not be the case if rootlets had to spring from nodes. This peculiar development of rootlets, therefore, enables the plant to put forth any number of them desirable, which it often does so as to cover the main root until it has a hairy appearance. The presence of parenchymatous cells is necessary for the development of branches, either on the stem or root. On the stem, the branches are formed only at nodes, where there is a ready organized bud; but the node itself is only a compact lateral development of parenchyma from the pith outward. The medullary rays, we have seen, are also a lateral development of parenchyma, permeating at all points and binding together the various tissues between the internodes of the stem. In the roots, these rays also bind the various tissues together, and form a connecting link between the bark and the pith. Instead of a root branching out from a regularly formed bud, as at a node on the stem, it springs from gemmation of the cell of a medullary ray. Something similar occurs on the stem when side limbs, known as water sprouts, develop.

The medullary rays of roots, besides multiplying roots and rootlets by gemmation, may develop new stems; as is the case in the root sprouting of the locust, cherry, plum, and some roses.

Roots, as a general thing, shun the light, and burying themselves in the earth, they seek there such food as the plant requires from the soil. The main roots fix the plant firmly to the earth, and their extensive ramifications lay a considerable area of the surface tributary to the nourishment of the plant. The younger portions only of the roots perform the functions of nutrition, and mainly by the innumerable fibrous rootlets they send out. These rootlets, seldom if ever branched, perish after performing their functions, but are constantly renewed.

CELLS.

The functions of the cells have already been partially indicated while describing their structure. First, cells may be regarded as digesters of the sap, transforming it into cellulose and parenchyma, for building up the skeleton of the organism, and for thickening and filling up the older cells, to give stability and firmness to the structure. Secondly, they are general digesters of the reserve elements in the plant, and of the crude elements taken up by the roots. Though cells are closed sacs, filled with fluid contents, yet there is a constant interchange of elements between them. In a state of rest, the contents of the cells may be, and probably are, homogeneous; but when vital action ensues, the transformation of the protoplasm into living organism, at such points where organic structure takes place, destroys the homogenity. This disturbs the equilibrium, and hence an interchange of elements ensues, to replace those consumed in building new structure.

DUCTS.

The structure known as vascular tissue should properly be called ducts. It consists of indefinitely elongated cells, of which the function is to conduct the fluid and gaseous elements taken up by the roots to every active cell in any portion of the organism. Hence they are of unequal length. Between them and the cell there is a similar interchange of elements as between the cells themselves. They also furnish the water with whatever it holds in solution to the cells, and from the latter receive the digested sap. Crude elements and digested sap seem each to have their appropriate ducts in the vascular tissue.

SPACES.

Intercellular spaces, though devoid of air, while cell formation in their proximity is progressing, when the structure is completed form air passages throughout the organism. In the milkworts these passages are filled with the lactex.

MEDULLARY RAYS.

The medullary rays branch off horizontally from the medullary sheath surrounding the pith. They keep up a communication laterally between the

pith and the bark, and perhaps also with the atmosphere. The annular or cambium ring is formed in spring by their action on the cellulose. In the latter part of the growing season, their action transforms the descending sap into starch, storing it up as formed in the cambium and alburnum.

BAST TISSUE.

The bast tissue is composed of the longest cells found in any tissue. Textile fibers, such as hemp and flax, belong to this tissue. The membranes are tougher, softer and more flexible than the cells of the woody tissue. Their toughness is proportioned to the length of the cells, but when short they are brittle. Where long, as in flax and hemp, they have great tenacity. They are the main channels of the descending sap, and elaborate from it various alkaloids, most likely with the concurrent action of the medullary rays.

LEAVES.

Leaves have been termed the lungs of the plant. If intended as a comparison of the functions performed, it is unfortunate, because it would lead to the inference that there was an analogy between the offices performed by the lungs of animals and the leaves of plants, while indeed there is very little. Lungs bring the blood, and leaves bring the sap, within the vitalizing influence of the atmosphere, and prepare them to build up vegetable and animal tissue. So far only the analogy holds good. But when we examine what takes place in the act of vitalization of each, we find it as opposite as the poles. In the lungs, the act of vitalization consists in the oxygenation of the blood; and the vital action in the animal organism ensuing therefrom decarbonizes organic matter to build up animal tissue. In the leaves, vitalization consists of deoxydating inorganic matter in the sap, and the vital action ensuing in the vegetable organism carbonizes the inorganic compounds before building up organic vegetable tissue. Moreover, the lungs of an animal draw not a particle of the nutriment from the air, while the leaves draw the greater portion of the nutriment for the plant from it. In the lungs, the mixture of veinous blood and chyle come in contact with the atmosphere, decomposing it, consuming the oxygen obtained, and exhaling the nitrogen and carbonic acid gas. In the leaves the digested sap decomposes the atmosphere, and the carbonic acid gas it holds in diffusion, consuming both the nitrogen and carbon obtained, and exhaling the oxygen. The leaf also decomposes water, to obtain hydrogen, which enters largely into the compound elaborated sap. The dynamical effect, in the correlating and conservation of force is also entirely different. The oxygenation and decarbonization effected by animals is the same as combustion; it liberates heat, while the deoxydation and carbonization effected by vegetation, imprisons heat. The analogy between the lungs and leaves, therefore, is very remote, and may be of use to assist us to understand the relative functions of each; but we must always bear in mind that it is by antithesis and not by harmony that the relation exists.

The inspissation of the sap also takes place in the leaves; first by exhalation of water, and secondly by its decomposition and the absorption of the

obtained hydrogen. The elaborated sap, when it quits the leaves, is, therefore, changed in its fluidity as well as chemical composition, suited to deposit in its downward course cambium, starch, gluten, alkaloids, etc.

III. VEGETABLE ECONOMY.

We have already seen that at the end of every stem, and at every node on it, there is a bud formed. These buds, in the economy of the plant, are either intended to perpetuate its life, or its species. The former are leaf, the latter flower buds. Flower buds only appear when the plant has attained or is approaching maturity. Diminution of nourishment, or impaired vital action, is supposed to be favorable to the development of flower buds. In trees and shrubs the flower buds appear on spurs, or beside the leaf bud. In herbs perishing annually, they supercede the leaf bud, or rather the latter is converted into a flower bud. The flower bud, therefore, is merely a leaf bud changed in form and function; and the leaves of the flower are but ordinary leaves changed in form and color. And as insects perform an important work in vegetable economy, in distributing pollen, the leaves of the corolla are colored for the purpose of guiding and attracting them.

STAMENS.

The stamens are only flower leaves that have still deviated farther from the normal leaf. In fact, they have deviated so far as to have lost the character of phænogamous leaves, and have acquired that of cryptogamous, by bearing sporangia. Stamens produce pollen, and if a pollen grain were self-proliferous it would differ in nothing from the spore of a cryptogamia.

PISTIL.

The pistil is a peculiar columnar prolongation of the parenchyma in the center of the flower. The pistil and stamens are called the organs of fructification.

The pistil has three subdivisions; the ovary, containing the ovules or rudimentary seeds; the style or columnar prolongation, and the stigma, which caps the style. A stamen has also three subdivisions; the filament, a thread-like stalk; the anther, capping the filament, and the pollen, a powdery substance, contained in the anther.

POLLEN.

Under the microscope, pollen grains have the appearance of spores; very often covered with protuberances not unlike the burr of the common Datura. Dissection shows the pollen grain to have two membranes; the outer, called *extine*, has an inflexible integument, and the inner, called *intine*, has a highly elastic integument. The intine is filled with fluid vegetable albumin, in which float innumerable particles of vibrionic matter called the fovillæ, which have an incessant molecular motion, like swarming bees.

The stigma has a moist network of cells, not covered by any epidermis, which receives the pollen. The cells of the stigma are tubes leading down

through the style into the ovary. The moisture of the stigma swells the pollen grain, bursting the inflexible extine and letting the intine escape. The latter then elongates down through the tubular cell of the style, and when it reaches the freer space of the ovary, swells out like a bladder, until it touches points where the ovules are attached to the embryonic sac. When the pollen cell touches this point a minute cell makes its appearance on the ovule, into which the fovillæ pass, and it has become a living cell.

GENERATION.

Vegetal generation is effected by the meeting of two cells of different origin; the pollen cell, containing the favillæ, and the embryonic sac, each filled with potentially vital matter. They coalesce, mingle their contents, and a new cell springs up, of actual vitality, out of which the individual plant is afterward developed. Endowed with vital force, and constituted an individuality, the embryonic cell commences its development. From its free end it elongates downward; minute granular matter appears in its interior, which before was perfectly clear and transparent. Soon transverse partitions appear, and the original cell is converted into a chain of cells, each having a distinct nucleus, the cytoblast. This first cell formation is by division of the original cell. After this chain of cells, as seen under the microscope, has obtained some length, the lower cell becomes globular, swells, its contents become turbid, and by gemmation develops a globular mass of cells. In the interior of this globular mass are first differentiated the plumule and radicle, as well as the parenchyma and cellulose.

After fertilization has taken place, the embryonic sac enlarges, and by secretion becomes filled with starch, gluten, oil, and the albuminoids. It is then called the seed.

After the maturity of the seed the vital force lays dormant until it is aroused by the intervention of heat and moisture, when it begins actual development into an organized, self-sustaining individuality of its parental type.

To enable it to develop, and to attain an organized structure, a supply of food was laid up for it by the mother plant, upon which it draws until the store is exhausted. These stores are generally starch, or compounds of identical composition and proportions, though there are some exceptions.

Plants of woody stems, such as trees and shrubs, come to rest after the exhaustion of the starch contained in the seed leaves and cotyledons, and make no further longitudinal growth that season. As far as I have observed, the peach is the only exception to this rule. It also comes to a rest and remains so, unless excited by cultivation and an abundant supply of air and nutriment. Under the latter favorable circumstances it will resume its longitudinal extension, and continue it until the close of the season.

In annuals and perennials whose herbaceous stems die annually, (unless the cotyledon leaves are converted into ærial leaves) the exhaustion of starch is also followed by a spell of languor or of more or less inactivity, when growth recommences with increased vigor.

ABSORPTION.

Every plant draws the elements of its nutrition either from the soil or from the air. Cells, we have seen, are closed on all sides, and the ends of the roots are covered with thin membranes, in which microscopes of the highest power have failed to detect any openings. How does the nutriment from the soil enter through this poreless membrane, and how is it transmitted and diffused through the cells after it enters? But first, what does enter, and what is its condition when it does so? The substances entering are lime, potash, silica, soda, magnesia, water, ammonia, carbonic, nitric and sulphuric acid, etc. The condition of the alkalies is, they are dissolved in water, and so is ammonia. Water, therefore, is the medium by which they are introduced within the organism. The acids are in the gaseous state. It is therefore evident that the plant cannot avail itself of any elements for nutrition, unless dissolved in water, or in a gaseous condition.

The transmission of matter dissolved in a liquid, or in a gaseous state, through closed membranes, is properly absorption. But on account of the movements started within the organism after their entrance for distribution and redistribution, it has been called by the scientific name of diosmose, which means impulsion through, from two Greek words, *dia*, through, and *mosos*, impulsion. Diosmose means impulsion through lengthwise; but there also are two impulsions sidewise. To that sidewise inwardly, the name endosmose has been given; and to that from the inward outwardly, exosmose. All these terms are borrowed from chemical and physical science, and when employed to designate chemical or physical phenomena are appropriate, but when used to designate physiological facts of life, in the absorption, distribution and nutrition of plants or animals, are of doubtful propriety. In physics, they mean only the reciprocal action and reaction of dissimilar dead matter, in juxtaposition. But if the vital force is nothing more than chemical action and reaction, then life itself is but another name for mechanical action.

Of life itself we know nothing, and can learn nothing, except what we can discover in its manifestations. In the manifestations of the vital force we can detect the presence of the cosmical forces, heat, light, electricity, magnetism, and chemical affinity, as the modes of motion. It is well known that the cosmical forces are convertible, one into the other, and that through the whole cycle of changes one is always the equivalent of the other. Motion, however, stands to them in the relation of genus, they being the species of motion. True, light, heat, electricity, magnetism and chemical affinity can all be converted into motion, and we know, also, that life is motion, but who has ever heard of converting heat, light, electricity, and so on, into life? Cosmical motion, and vital motion, then, are not convertible terms. Though every one is conscious that life is motion, yet he recognizes it also as something more. While, therefore, it is allowable to use mechanical terms to illustrate and explain the facts and phenomena of life, yet we must be careful not to be led ourselves, nor lead others, into materialism.

As already stated, in the manifestations of life we detect the presence of the cosmical forces. For instance, there can be no life without a definite amount of heat. By the law of its being, each living organism is so constituted that it can only exist within the limits of certain degrees of temperature. Within these limits there is a point of the highest vigor of vital action. If the temperature varies, either by increasing or decreasing from this point, vital action suffers, and will be destroyed if the variation proceeds to extremes in either direction. Like gravity, heat is an inexhaustible property of matter. Always radiating from all points of space, it is yet incapable of exhausting its sources. The ulterior law controlling its radiation is not known. But when any body receives heat, either by radiation or conduction, it develops in it positive, and when it loses heat by radiation, negative, thermo-electricity.

In fact, heat seems to be the active agent for developing electricity, magnetism and chemical affinity. Chemical affinity only acts upon matter in juxtaposition, but electricity and magnetism, if a proper medium is furnished, can travel and act at indefinite distances.

But heat travels everywhere, with or without a medium. Life, like the other forces, requires heat for its development, but it would be an unpardonable blunder therefore to assert its identity with them. The cosmical forces operating on inorganic elements produce merely inorganic compounds, but when acting under the controlling influences of the vital force from inorganic elements they form organic compounds and build up organic structure. It is therefore evident that, within a living organism, they are the servants of the vital force. While from necessity we are unable to explain the phenomena of plant nutrition without the operation of the cosmical forces, we must always keep in mind that their action is subordinated to a controlling force, the vital force over them, and not a mere mechanical action as in inorganic matter.

How far, then, can these forces be made available to explain nutrition and the various phenomena of plant life? Heat, the omnipresent force inherent in matter, must, in degree and intensity, accumulate in and around the embryo to start it into life and accompany it throughout all its future developments. When heat fails, growth ceases. Heat, we have seen, also develops and brings into action the other cosmical forces. One of these is electricity, a species of which is galvanism. What evidence have we that either electric or galvanic action is taking place in vegetation? The leaves give out oxygen in the ozonic condition, the same as the electrodes of a galvanic battery. Whence comes this oxygen? The hydrocarbonates, of which the elaborated sap is composed, show that both water and carbonic acid have been decomposed to supply the hydrogen and carbon. There is no way of explaining these facts without admitting the presence of electric or galvanic action. Wherever there is electric action there are two opposite poles to the current. One of these poles is evidently in the leaves, for no chemical decomposition takes place in a galvanic current, except at the poles of the battery. Where, then, is the other pole? Unquestionably at the other extreme of the organism, at the *points of the roots*. Is there any evidence of galvanic action

around and about the roots? We know that the alkalies are not free in the earth, but form many compounds; many of which are insoluble in water, but are easily resolved under the action of a battery. The plant, manages, somehow, at all seasons, to get a full supply of these, when we know there is not water enough in the soil to act as a solvent. Admit galvanic action, and the whole mystery is explained.

Again, the medullary rays elaborate starch from the descending sap, and fix it in the cambium and alburnum. Galvanic action again explains this. So also the formation of the alkaloid crystals, as developed in the bast cells by the joint action of the bark and medullary rays. The motion of the protoplasm within the cell being alternately mutually repelled and attracted by the cytoblast, and the evolution of cellulose from the clear fluid of the cell, are all explainable upon the hypothesis of galvanic action. And so of many other phenomena in plant life.

It must also be borne in mind that, by the free interchange and transmission of the different elements of the cells, the alkalies and acidulous juices of the plant are constantly commingling; which alone, without any extraneous aid, would start a galvanic current.

The fact that the alkalies are not free in the soil, but bound up in various compounds, has already been stated. But supposing they were free, they are so distributed through the soil that it would be impossible to have rootlets enough to go out in search of them to collect them. Then, again, when collected, unless they were in juxtaposition with dissimilar elements with which they had affinity, they would be inert. But they are not inert. Here then is the difficulty. Since the roots are not numerous enough to search them out and collect them, then they must go to the roots. If the mountain will not go to Mahomet, then Mahomet must go to the mountain. How can this chemical inertia be broken up, so that each particle will move to the roots? If there is any known law by which this can be effected, then the whole difficulty vanishes.

Suppose we take a vessel filled with a diluted acid, holding some metal, gold for instance, in solution. We put in the vessel some metalic substance, and operate upon it by a galvanic battery. The gold held in solution by the acid will move to and be precipitated upon the metal, in other words, gild it. Suppose again, instead of putting the metal to be gilded directly into the acid, we put it into a bladder or series of bladders, filled with water or any liquid dissimilar to the acid. We again subject it to a galvanic current, and it is gilded the same as before. The galvanic current then has not only broken up the inertia of the gold held in suspension, but it has given it mechanical transportation, not only through the acid but through the animal integuments and the water. Hence we find that if we admit galvanic action in the roots we solve at once two difficulties. It will not only give transportation of the alkalies to the roots, but also through the membranes of the roots.

The question has been discussed, what gives the impulsion that makes the sap flow upward, as we find to be the case when in early spring a maple tree is wounded, and more especially in the bleeding of the grapevine? It is not

necessary here to present the explanations given to account for this fact, but merely to state that none are satisfactory.

There are many phenomena manifested in plant life to which science has not yet furnished adequate explanation. If any two of these phenomena can be satisfactorily explained by one and the same agency, the presumption is in favor of the explanation afforded by said agency. There is one phenomenon, that of a plant possessing, when the thermometer ranges low, a higher temperature than the surrounding atmosphere, or soil even, which has not been explained. Can any supposed agency be imagined that will effect both the upward flow of the sap and the excess of temperature?

Nitrogen is a chemical neutral, or rather negative. It enters directly into combination with no other element, but indirectly it forms the most powerful of all combinations. When other elements combine to form compounds, they, unless the compound occupies greater space than the constituent elements did, liberate heat. But when nitrogen enters into combinations it reverses this rule, it imprisons an enormous amount of heat, as is attested in gunpowder. The universal characteristic of nitrogenous compounds is their instability and easiness of dissolution by the least disturbing agent, often exploding with great violence—of which gunpower, guncotton, nitro-glycerine and dynamite are examples. Nitrogen, in the form of ammonia, is absorbed by the roots. Within the tissue starch is converted into the various forms of the albuminoid compounds, of which nitrogen is a component part. These again are transformed into the organic compounds cellulose and parenchyma, of which nitrogen is not a component part. In the breaking up of these nitrogenous compounds, may not the nitrogen, by explosion, or at least by expansion when it returns to the gaseous form, give this upward impulsion, while at the same time it liberates the heat it fixed in combining?

For every season the plant has its appropriate work. In the spring, when it wakes up after its long winter nap, it repeats the identical operation its embryo did when it woke up in the seed: it nourishes itself by assimilating the starch into cellulose and parenchyma, sending its roots downward and its branches upward, and adorning them with leaves and flowers. It then neither grows laterally, unless the cells of the cambium ring be called lateral growth, nor does it elaborate and store up starch for the next year. Its work then is, by the ascending sap, to assimilate the stores of starch deposited the previous year into cellulose and parenchyma. But the ascending sap builds no structure excepting the pith, the medullary sheath that surrounds it, the medullary rays, the cuticle and leaves. In old plants it also fills up the old cells with cellulose, converting the alburnum into duramen, that is, heart wood. On the contrary, the descending sap commences its work when the stores of starch are exhausted. It builds the cambium layer and new bast tissue, and from it, as already stated, the medullary rays elaborate starch and other isomeric compounds, storing them up in the cambium and sap wood, the richest stores of which, however, are in the roots. Crystals of the alkaloids, possessing the medicinal properties of the plant, and sometimes highly poisonous, are elaborated likewise by the liber in the bast cells.

The movement and function of the descending sap is so evident as to leave no room for doubt. If a branch of a tree is girdled in spring by removing the bark for an inch or so, that portion above the girdle will receive an abnormally large development of the cambium layer, a large store of starch and albuminoids, while below the girdle no cambium is deposited, and no starch elaborated and stored away. Moreover, the downward flow of the sap will push the cambium downward over the ring, and, if the latter is not too wide, will re-establish communication below it.

The building of cellular and vascular tissue by the ascending sap ceases about the summer solstice. The starch is then exhausted, and longitudinal growth comes to rest for the season. The plant is then organized, and it commences the work of enlargement laterally, and laying in provision for perpetuating its life. To this work, and to the ripening of its fruit and seed, it devotes the remainder of the season.

These are important facts in the economy of plants, which furnish many useful suggestions to the cultivator. When the starch is exhausted timber should be cut, for then it will afford but little food for borers. Starch, while it exists in the wood, is constantly being converted into albumen, which is a nitrogeneous compound, and unstable, like all such compounds. Albumen in wood, like the albumen in fresh meat, is the cause of rapid decay and decomposition. Timber cut when the starch, and consequently also the albumen, is exhausted, will have greater durability than when cut in winter, when full of starch. Again, starch is the provision stored up to develop new stems, roots and leaves the next season.

There is that foul troublesome weed, the horse nettle (*Solanum carolinensis*), which sends its perennial root down too deep for eradication. Exhaust it by continual hoeing down, so that it will have no supply of starch to start growth with the next year, and it will never appear again. In July is the best time for sprouting, because then no reserve of starch has been deposited to develop organisms in the future. You may smother the grass in your pastures the same way, by letting your stock crop it too closely when it is about replenishing its roots for the work of next year. Above all, you may ruin your timothy meadow by mowing before the leaves and stems have performed their functions in replenishing the roots, so that no new shoots will start either the same or the following year. That insensate summer pruning of the grapevine, which goes slashing in the vineyard in July and August, and which has very aptly been styled "summer slaughtering," is in violation of the laws of vegetable economy, and consequently followed with such direful results. I have seen a fine vineyard of Norton's Virginia completely exterminated by it in a single season. A knowledge of the laws of vegetable economy would have been worth thousands to its proprietor. A knowledge of the laws of vegetable economy may also be made available to increase the health, vigor and productiveness of plants, as well as their destruction. As we said at the beginning, the highest results of vegetable productiveness is not attained in a state of nature, either in quantity or in quality, but is brought about by the intelligent control of man. Man cannot control the laws of nature, and any attempt to do so must end in failure and destruction.

All he can do is to bring his operations to harmonize with, and to aid these laws. Sometimes his object may be destructive, as in the case of sprouts and weeds; but it is oftener to assist nature in attaining the highest results. In either case, to act intelligently, he must know what these laws are, and the mode of their operation.

As almost everybody is now planting grapevines, I will take the vine as an illustration.

The object of pruning it is to attain the highest degree of health and vigor, and at the same time the finest and largest quantity of fruit. How will the laws of vegetable economy aid him in his operations?

The vernal growth of all plants, we have seen, is effected by a mere assimilation of the starch stored up the previous year. The plant consumes, or rather transmutes, this, by extending its roots and branches, clothing the latter with bloom and foliage. When this is accomplished, its operations are all directed to provide for the future. Starch, we have seen, is laid up in the alburnum and roots, but more in the latter than in the former. Suppose that the vine demands one hundred square feet of leaf surface immersed in the air, to perform its vital functions healthfully. We give it no pruning; it expands a leaf surface to one hundred feet or more. The leaves are smaller and more crowded than if they had been intelligently distributed. Some of them are insufficiently aerated, and they sicken and die, in consequence of which the general constitutional vigor of the vine is affected. There are more bunches of fruit that can mature; they also suffer. When the fruit is matured the berries are small and the fruit is inferior. The vine also grows more and feebler canes than it can maintain in full vigor next year. This is the result that nature accomplishes unaided by the guiding, controlling hand of man. How can better results be attained both in healthfulness and fruitfulness? The intelligent vine dresser inspects the size and constitutional vigor of the vine. He estimates its capabilities for bearing fruit, and its wants for vigorous health, and prunes off whatever is redundant for either. The starch being in excess in the roots, what is cut off in pruning would not suffice for forming the new extension of leaf and branches on the excised canes. The pruned vine, finding itself curtailed in its dimensions, starts vigorously the buds on the remaining canes, putting out a branch and a bunch or more of bloom at each end. The vine dresser watches its operations, and, looking to the future, will not let the vine expend its energies in producing that which is superfluous, and which will have to be pruned off next year. For fruiting canes next year he wants a definite number, according to the vigor of the vine. If the vine starts more than he wants, he rubs off the surplus. On the fruiting canes of the present year he only wants healthy and adequate foliage enough to develop and perfect the fruit, and none to make surplus wood. Therefore, when a leaf or two has been developed beyond the last fruit bunch, he pinches off the extending cane. Thereby he husbands the resources of the vine. For, instead of exhausting itself in longitudinal extension and leaf building, it expends its vigor in developing the fruit and remaining leaves, both of which become abnormally large. The

leaf becomes, perhaps, twice as large as it would have been had longitudinal growth not been checked.

From the axils of the leaves laterals may start, which, after developing a leaf or two, are again pinched off. The result is large, healthy leaves, and not a crowded mass, exhausting and smothering each other, are developed in the immediate vicinity of the fruit, bringing it to the highest degree of perfection, while the cane on which it grows, and which is to be pruned off the next season, makes but little growth.

But how is it with the canes for fruiting next year? They are left to take their own course, unchecked by pruning, and develop an abundant supply of healthy, vigorous wood for the next year.

For the want of time, this illustration of the application of the principles of vegetable economy must suffice. There is, however, a mooted question about the best time to cut timothy for hay, which deserves a passing notice. There seem to be many notions about this, and each one has his own; but no one has ever tried to settle it upon a scientific basis. This is a question that can be settled by experiments conducted upon laws of vegetable economy. If timothy can only yield the highest results to man at the expense of its own life, then it ought not to be exacted of it. If it yields the best results to man when time is given to provide, not only for the perpetuation of its own life, but also for that of its species, then it ought to be known, to govern the operations of man. But at present neither is known.

To determine this, let equal areas of land be cut at different periods; one when in bloom, another intermediate, between the bloom and the full maturity of the seed, and one when the seed is fully ripe. Let the quantity obtained from each be weighed, both in the green and dry state, and let equal weights of hay of each be analyzed to ascertain the relative amount of nutriment in each. This will settle the question as to immediate profit. But let also the effects of cutting at each period be noted on the health and vigor of the roots. These experiments and observations will elicit facts that will fix, beyond controversy, the particular time for cutting hay.

The example of the culture of the vine, employed to illustrate the application of the principles of vegetable economy, has furnished the fact that culture, by directing and controlling the nourishment, effects a deviation in the fruit, making it larger, finer, and more delicious than in the normal wild state. Culture, for an indefinite number of generations, not only fixes this deviation, but begets still greater. Deviation correlates to the care bestowed to effect healthy and more vigorous growth, by directing the energies into proper channels, and supplying more abundant nutrition. All our cultivated fruits were in this manner, by a long series of years and careful selection, developed from unpromising, acrid, wild specimens. The wild pear, an extremely acerb fruit, is yet found in Europe and Asia. How long a term of cultivation it required to make it palatable is not known. But if Columella is to be believed, in his day the Roman Emperors, at their feasts, boiled it in wine to make it palatable.

Change in the external normal condition and nourishment has converted single rayed into double flowers, by converting the stamens, and sometimes

the disk flowers, into petals. The Dahlia and double Zinnia are recent examples of this law of vegetable economy. The tendency in all deviations is uniformly to increase by further propagation.

But deviations are not always improvements. The departure from the normal type may take an opposite direction, and may become a deterioration, and this deterioration may increase. The further propagation is carried on under the abnormal condition of cultivation. In Europe this is the case when some variation of nut trees are cultivated. Cultivation, sooner or later, induces not only deterioration but degeneration, which increases with the continuance of cultivation, while the wild trees never degenerate.

DISEASES.

Diseases of vegetation originate from disturbances or irregularities in the normal vital functions of the organs. They may be, like their causes, local or general; and may make their appearance in different ways, according to the nature of the disease or the plant it affects.

The primitive causes of all diseases are perhaps always found to be external. The changed circumstances, unfavorable to healthy growth, brought about by cultivation, is a fruitful source of plant disease. These and local causes may enfeeble the plant so that parasitic plants make their appearance on the vital tissue, as mildew and blight. Insects may select the succulent shoots and leaves for depositing their eggs, which develop galls and knots. But the most general diseases are sequences of violent meteorological changes, such as sudden, frequent and extreme changes of temperature, excessive moisture, or drouth, etc. Local causes of disease are less detrimental than those that are general. With the cessation of local causes, and the removal of the affected part, health returns. Sometimes these causes are within the control of man, but not always. The potato disease is caused by sudden and severe chilling and flooding while growing. The fungus that rots it is not the cause of the disease, but the consequences of it. It is the common *oidium lactis*, that merely seizes upon the dead matter of cells that have died, and decomposes it. The sweet exudation on the surface of leaves, known as honey dew, is supposed to be occasioned by the engorgement of the leaf cells during unfavorable conditions of the atmosphere for evaporation.

Many plants suffer if they have not sufficient light; others love the shade, and perish if exposed to the full glare of the sun. Some flourish even during long continued drouth, but soon perish in excessive moisture, and vice versa. One plant needs a high, another a low temperature. Some perish if the sap freezes, and others can withstand uninjured a temperature many degrees below zero. Though there is a great variation in the temperature that plants can bear, yet there is none that can endure the boiling point. One plant is indifferent to sudden and great variations of temperature, another perishes even in a little variation.

The cultivator of plants, it will be thus seen, must possess not only an intimate knowledge of the structure, function and economy of plants, but of their constitutional vigor, habits and power of endurance.

TIMBER GROWING.

A LECTURE BY O. B. GALUSHA.

The influence of forest trees upon the atmosphere, in purifying it by absorbing noxious gases, in equalizing its degrees of humidity, in softening the asperities of its temperature, in checking the force of its violent gales, so often destructive to growing crops and injurious to domestic animals, and thus securing a carpet of snow in winter to protect the roots of plants from the damaging effects of severe frost, are truths upon which nearly all men of science and observation are agreed; and certainly they are facts of so great importance that they should command the immediate attention of all dwellers upon the great western prairies. It does not come within the province of an essay upon "timber growing" to explain the principles in meteorology, electricity, chemistry and vegetable physiology, which operate to produce these important results. These subjects have been ably treated in other papers; yet we may and should consider the effects of these causes, inasmuch as they indicate to us the path of duty or economy in the direction of forest tree culture.

Foreign nations accuse the "Universal Yankee Nation" of being "slaves to the almighty dollar." That the American people are impatient of results, is a fact of every day's observation; and this, perhaps, justifies, in a measure at least, the opinion which the citizens of the old world entertain of us. The consideration of profit to ourselves, instead of benefit to posterity or ultimate good to the nation, has ever been too prominent among our incentives to action. But the time has come when we are called upon to prosecute enterprizes which look beyond the present generation for results. We must, for our own national salvation, look threatening disasters full in the face, and prepare to avert them. If we are to achieve and maintain our manifest destiny as the greatest and most prosperous people upon the globe, we must at once commence laying the foundations of this success. One of the important steps in this direction is the cultivation of trees for their climatic influences and for uses in the mechanic arts. The wide extent of our American prairies renders this work far more imperative upon us than it has formerly been upon the people of transatlantic countries; yet the history of many countries of the old world admonishes us of the folly of our present course of wholesale destruction of forests and neglect of planting new ones for the use of future generations.

The fact that our home groves are fast diminishing, without adequate efforts being put forth to make up for the loss, is apparent to all. But it is not generally realized to how great an extent the same is true of the pine regions of the North, from whence we now draw almost our entire supplies of timber and lumber for building purposes. Lumber is becoming dear each succeeding year, not, as has been generally supposed, from the high price of labor, so much as from the fact that the timber, at almost all points easy of access, is either thinned out or entirely used up, so that logs are now often drawn great distances to the rivers, and floated long journeys to reach those mills which,

a few years since, were supplied from adjoining forests. The amount of timber in portions of these vast pine regions has been greatly overestimated. I have traveled over and looked over hundreds of thousands of acres of these lands, extending from the southern point of Green Bay to Lake Superior, and am fully persuaded that two acres out of three, in this great territory, are either destitute of trees or covered with such varieties as are almost worthless. The fires which sweep over these vast plains, and through the forests, destroy the young trees, except here and there an isolated tract, so that we here find little or no provision for a supply when the present crop of trees is exhausted.

While we cannot prevent the destruction of our forests for the use and benefit of the present generation, we can and should take measures to create forests upon our farms, which will be ample to supply the wants of those who are to come after us. Comparatively little has as yet been done in this direction, and this little has been confined mainly to the cultivation of those varieties which are of rapid growth, and which would consequently bring the quickest returns. While these varieties are, perhaps, more profitable for artificial groves than most of the slower growing ones, yet it is highly important that a sufficient number of kinds should be grown to subserve all the purposes of the mechanic arts, and these arts call largely for the close, firm texture of the slower growing varieties. I am inclined to the opinion that the rate of growth in trees is generally underestimated, and am quite sure that comparatively few landholders realize that large profits would ultimately accrue from cultivating groves, even of the more moderate growing varieties. To illustrate the rate of spontaneous growth of such sorts I will cite an instance which has come under my own observation.

A few miles from my residence are a few acres of ground which were cleared of timber sixteen or seventeen years since. There was then left upon the ground a growth of underbrush only, consisting of several varieties of oak, hickory, ash, and some other sorts. I have watched the growth of timber there from year to year, until the present time, and am myself surprised at the result.

The land was worth, when cleared, perhaps twelve dollars per acre, not more. There have been taken from it, during the last seven years, poles equal in value, probably, to ten dollars per acre; and one hundred and fifty dollars per acre would hardly buy the trees now standing upon it. So that if we estimate the value of the land (at the time mentioned) at twelve dollars per acre, and compute the interest upon this for sixteen years, at six per cent., compound interest, adding the amount of taxes accruing during the time, with interest upon this at same rates, we have one hundred dollars per acre as the net profit of the timber crop, while, of course, the land itself has partaken of the generally enhanced value of surrounding real estate, and would now probably sell for fifty dollars per acre, were the timber removed.

A German friend, for whose integrity I can safely vouch, tells me that when he was a lad, and in his native country, his father had a tract of eighty acres of poor land, upon which he had tried in vain to raise remunerating crops. It was finally prepared in the best manner and planted with seeds of Nor-

way Spruce, which grow readily there in the open ground. These trees flourished, and, after a few years' cultivation, were left to themselves, thinning them out as they became crowded.

At ten to fifteen years' growth, immense numbers were sold, in thinning out, for hop poles and grape stakes. This tract is now a well timbered forest, from which fair sized saw-logs are cut, and every part of a house can be built with its timber.

These seeds were sown only thirty-six years ago! What would such a lot be worth upon the prairies of Illinois? Who would estimate its value at less than one thousand dollars per acre? What farmer upon the prairies of Illinois would wish to leave a better legacy to his sons? What has been done upon the poor hills of Germany, except starting the plants in open ground, may be repeated, and with equal or greater results, here, where all the hardy varieties of evergreen, as well as deciduous, trees grow luxuriantly.

The rates of growth in the more common varieties of trees may be observed by any one, and the time required to bring them to a size suitable for building purposes, and use in the various mechanic arts, easily calculated; thus the actual cost of raising timber may be very nearly ascertained.

Let us estimate the expense of raising a grove of ten acres, planted with white ash and black walnut—five acres with each. These varieties grow at about the same rate, and are about equally valuable for lumber.

The seeds of the ash, like all seeds of this class which ripen in the autumn, should be gathered when ripe, and kept in the cellar through winter. The walnuts, as other nuts, should be spread evenly upon the ground, where surface water will not stand, not more than two nuts in depth, and covered with two or three inches of mellow soil, that they may freeze during winter—to be planted as soon in spring as they show signs of sprouting. The land should be deeply plowed, late in fall if practicable, and finely pulverized in early spring, and marked both ways, as for corn, three feet eight inches apart. The tree seeds and nuts should be planted eleven feet apart, which will admit of two rows of corn or potatoes between each two rows of trees. By putting two or three seeds in a place—to be thinned out to one if both or all germinate—an even stand may be secured. A better way is to plant in rows, eleven feet apart, running north and south, and three feet eight inches (in the marks for corn.) This will secure straight trees—being closer—and they may be thinned out to eleven feet each way when large enough to use for grape stakes, bean or hop poles. This will give three hundred and sixty trees per acre, or three thousand trees in all, allowing for sixty vacancies, though in all cases of tree planting, whether in groves or screens, a supply of good plants, grown elsewhere, should always be in readiness to use in filling vacancies, which should be done at the end of the first year.

The preparation of the ten acres of ground, at five dollars per acre, would be fifty dollars. Average cost of seed, fifty cents per acre, five dollars. Planting, twenty-five dollars. The cultivation during the first five years will be paid for in the crops grown between rows. For cultivation from fifth to ninth years—four years—with horses only—thirty dollars per year, one hundred and twenty dollars. After this time no cultivation or care will be

seeded. This makes the entire cost, in seed and labor, of the ten acres of trees, two hundred dollars. These trees will, at twenty-five years of age, average sixteen inches in diameter at the ground, and about ten inches at the height of sixteen feet. This will give, deducting waste in sawing, one hundred and twenty feet of lumber per tree. Allowing one-sixth for damage by the elements and loss from other causes, we have in round numbers three hundred and sixty thousand feet of lumber, which, at fifty dollars per thousand, would amount to eighteen thousand dollars. The value of the tree tops for fuel would be equal to the cost of preparing the logs for the mill, and the expense in sawing would not exceed five dollars per thousand feet. This, added to the cost of producing the trees, and the amount deducted from the value of the lumber, leaves *sixteen thousand dollars for the use of ten acres of land for twenty-five years*, and the interest upon the amount expended in planting and cultivating the trees! This statement may be deemed incredible, perhaps, by those who have not previously turned their attention to the subject, but after much study and many years observation and measurements of growths of different varieties of trees, I am convinced that in all well conducted experiments in growing artificial groves upon our large prairies, the profits will not fall far, if at all, short of the rates above stated. It must be borne in mind that trees standing at regular and proper distances upon rich prairie soil, and receiving good cultivation, will grow much faster than the same varieties usually found growing in natural groves. For a list of varieties suitable for planting in artificial groves, I would refer all interested to the lists recommended by our State Horticultural Society, with the remark that the planter can hardly be in error in planting any tree which is indigenous in a soil and climate similar to his own; while many trees, whose native homes are found in latitude north or south, have thus far proved valuable, as the Osage Orange and Catalpa, from the South, and the Red Pine and White Spruce, and others, from the North.

Some foreign varieties are equal or superior to any of our natives; among which are European or Scotch Larch (best of all foreign deciduous trees), Austrian and Scotch Pines, Norway Spruce and White Willow.

I regard this last as probably combining more desirable qualities for cultivation in groves for lumber purposes than any other variety of the soft wood, rapid growing deciduous trees, and am decidedly of the opinion that this and the golden variety are the best deciduous trees within my knowledge for wind-breaks or screens, but wish to be distinctly understood as not recommending this tree as a "hedge plant," or the planting of this or any other one sort to the neglect of other desirable varieties. Strong cuttings of this tree seldom fail to strike root at once in mellow soil, and will make a growth of from two to six feet the first season. It thrives in all kinds of soil, making as much wood in a given number of years as any other known sort, not even excepting the cotton wood, growing into a large tree, sometimes four feet in diameter. The wood is of rather fine texture for a light wood, making a fair article of soft lumber, which bears a fine polish. It is also valuable for making wooden ware, bowls, trays, etc. It also splits freely, which is a desirable quality in making fence posts, rails, railroad ties, and fire-wood. I

would here remark that it is more than probable that before five years are past the present mode of infusing the gasses of coal tar into the pores of timber will be so improved, or some other method, that soft and porous wood will be rendered almost indestructible, and at a trifling expense. If any Professor or student in this University would accomplish this achievement, he would confer a blessing upon the State which would repay an hundredfold all the expense of establishing and maintaining it.

The golden willow is similar in growth and texture to the white, but I think does not make so large a tree. I have measured about a dozen trees of this variety (golden) which were planted by the road side fifteen years ago last spring, and find the average circumference of the trunks, at three and a half feet from the ground, to be five feet and three inches. A white willow, standing near my house, which has grown from a small cutting put in thirteen years ago last spring, now measures six feet and two inches in circumference near the ground, forming a head or top thirty feet across. This variety, when planted in groves, grows tall and almost perfectly straight.

I have carefully computed the expenses of raising ten acres of trees of this variety, and converting them into lumber and find the entire cost not to exceed ten dollars per thousand feet.

This estimate is based upon actual measurement of the growth of trees. The land is valued at forty dollars per acre, with interest upon this amount, together with expenses, computed as before, at six per cent. compound interest.

I take ten acres in these estimates of growing artificial groves because it is desirable to have trees enough together, or in close proximity, that the cost of putting up and removing a saw mill would be but a trifle upon each thousand feet of lumber sawed.

TIMBER BELTS.

The actual profits which would accrue from a general and uniform system of cultivating trees in belts, or double rows, for protection, cannot as readily be estimated; yet no one who has carefully investigated this subject can doubt the utility and economy of such screens. To show the possible extent of their beneficial influence, I will call up an instance which, probably, very many of this audience will remember.

In the year 1862, at the time when spring wheat and oats, in the northern portion of the State were just past the bloom, and a portion of the grains in the milky state, we were visited by a storm from the northwest, which swept over this portion of the State, prostrating nearly all the grain not sheltered by timber.

I have selected this instance as an illustration, because of the extent of the storm, and also on account of the marked effects of protection by timber in this storm, which clearly showed that the entire loss might have been prevented by belts of trees. In one locality a single line of broad and tall willows, closely planted, proved a sufficient check to the wind, so that a field of wheat adjoining it upon the east stood erect, and was harvested with a ma-

chine, while in exposed situations, the shrunken grain, if saved at all, was often gathered by the slow and tedious process of hooking it up with scythes. Many thousands of acres were left to dry, and were burned upon the ground, which two or three weeks before harvest promised abundant crops. The extra expense of gathering the grain of that harvest could not have been less than fifty cents per acre on the whole amount harvested.

I traveled quite extensively over this portion of the State before and soon after the harvest of that year, and am convinced that one-half the value of the wheat and oats in the territory passed over by that storm was destroyed by it.

There were sown in that year, as per census reports, in the thirty counties lying north of the Burlington, Peoria and Logansport Railroad, about one million two hundred thousand acres of wheat, and at least one-fourth as many of oats. Allowing one-tenth of these crops to have been protected by timber, we find the loss to have been equal to five hundred and forty thousand acres of wheat, and one hundred and thirty thousand acres of oats.

Computing the wheat at fifteen bushels per acre, and the value at fifty cents per bushel; the oats at thirty bushels per acre, and price twenty cents per bushel, we have the sum of four millions eight hundred and sixty thousand dollars, as the cash value of property in these two crops alone, which was destroyed in a single storm in an area of a little more than one-third of our State.

Allowing one hundred and fifty thousand acres to have been burned, or not harvested, and adding to the amount of loss fifty cents per acre of the remainder of the nine-tenths (lodged grain), equal to six hundred thousand dollars, it swells the amount to the enormous sum of five million four hundred and sixty thousand dollars.

Let us see how much it would cost to plant and cultivate screens to prevent such losses. A double row of white or golden willows, with trees in the second row set opposite the spaces in the first, planted upon the west side of every eighty acre lot, would doubtless prove sufficient, as they would, at the age of twelve years, form a dense wall of foliage about forty feet high, and would of course increase in size for many years thereafter.

These would cost, per mile of screen, about as follows: Average value of two acres of land, forty dollars per acre, eighty dollars; preparation of the soil, and planting with strong cuttings, ten dollars; cultivating the first two years, twenty dollars; making a total cost, with purchase money of the land, one hundred and ten dollars. After two years no care will be needed, save a mulch of refuse straw, to be renewed once in two or three years, the cost of which will be more than repaid in the partial protection which the trees will render previous to the twelfth year.

There are, in the thirty counties referred to, about sixteen thousand six hundred and twenty-five sections of prairie land. This will require sixty-six thousand five hundred miles of screen, if planted as above proposed, making the entire cost seven million three hundred and fifteen thousand dollars. Thus we see that, without estimating the immense damage done to fruit and other crops, the wheat and oats destroyed in that storm would, if saved, have

paid about three-fourths the entire expense of growing timber belts throughout that entire territory!

I think it may be safely estimated that an average of one-twelfth part of all our crops of grain and large fruits are destroyed by violent winds, which such a system of protection, or its equivalent in groves, would so far check as to prevent the destruction. If this is true, such protection would save to the husbandmen and orchardists its entire cost every two, or, at most, three years. Such protection, too, would, by causing the snow to remain spread evenly over the surface of the ground, as before hinted, enable the farmer to raise winter wheat in localities where it is now impossible to do so.

If we add to the benefits of tree culture already considered, those far-reaching and incalculably valuable climatic influences which would flow therefrom, we must all admit the necessity of commencing this great enterprise at once, and prosecuting it with vigor.

I do not introduce this plan of planting straight belts of trees, a quarter of a mile apart, because it is the most desirable plan which can be adopted, for no man of taste would regard it as such. The eye would soon tire of such stiffness and monotony in the landscape. Tree planting may be so planned and conducted as to give beauty to the landscape, and at the same time secure nearly all the combined benefits of protection to crops, timber for uses in the mechanic arts, and those climatic influences which we all regard as so important. Of course no rules can be given for such tree planting. Generally, where the surface is somewhat undulating (for we have no hills), the planting should be done mainly upon the higher portions of the farms, and along the water courses. Where the surface is level, belts may be planted upon the north and west of the farms, with groves upon the least valuable portions. These last would intercept the straight lines and give diversity. But if each prairie farmer were to follow his own taste, or adapt his planting to secure the greatest profit in timber or protection to his own farm, planting about one-tenth of his land with trees, it is probable that all the desirable ends which we have been considering will be gained, and the landscape sufficiently diversified to be pleasing to the eye.

Here, then, brother farmers, and farmer students in this University, we have two pictures presented to us. In the one we look into the future and see wide spread desolation—an extended treeless country, visited by destructive storms, by severe drouths, with its streams dried up, and food for man and beast in such scarcity that the poor can scarcely obtain a supply. In the other we see a charming landscape, a rich, fertile country, a population enjoying all the blessings which flow from peace and plenty.

Which will you choose? Will we take warning in time, and arouse ourselves to action in an enterprise which promises such rich results?

DISCUSSION.

Mr. Miner—I have given some attention for nineteen years past to growing timber. I plant the walnut. I differ with the

speaker in regard to the time of planting. I gather them in the fall of the year and plant immediately. I strike off furrows with the plow, and plant them without taking the hull off, and the work is done. I do not see anything gained in laying the nuts away in the cellar and planting next spring.

Mr. GALUSHA—The only gain that I see is to have the ground in readiness to grow other crops between. We get a more even stand planted in the spring.

Mr. FREEMAN—It is well known that the nuts require frost and moisture in order to force them open. By the speaker's plan you can get a better stand, especially if you assort the nuts. By this means you get a more uniform stand in your plantation.

Mr. MINER—I still think my plan has some advantage. In the fall the ground is dry, and we have more leisure to do the work. In the spring the ground is wet, and is not in so good a condition as in the fall. I have no trouble to know when my walnut trees are in the row. Here in Illinois (take my own case) we have a great deal to do, and if this work is not done in the fall it will in all probability be neglected. If I were going to plant more trees, as I probably shall, I would plant in the fall. I now have planted and growing groves of cottonwood, walnut, sycamore, wild cherry, maple, the sugar tree, osage orange, and some crab apple. I am an advocate of tree planting.

Mr. ROBINSON—I wish to ask what is the value of the European Larch as to durability?

Mr. GALUSHA—So far as we know it we have everything in its favor as to its durability. This tree and the white willow stand at the head in this respect, and greater profits are realized from growing groves of the European Larch than any tree next to the white willow. I would ask if the gentleman has had any experience in growing the soft maple, and whether his trees are troubled with the borer?

Mr. MINER—I have never been troubled with the borer in my maples. I have the trees three years old. My black locusts are destroyed entirely.

Dr. WARDER—How soon are your locust trees attacked by the borer?

Mr. MINER—At two or three years old. I planted them fourteen years ago.

Mr. Robinson said that he planted locust trees, and the borer destroyed them.

Dr. Warder—I see there are some very fine trees here in Champaign. Has any one seen the borer attack this tree in the first year?

Mr. Robinson—Not the first year, but I have seen them attack it the second year.

Mr. Ludlow—I have made several efforts to grow this tree. The first year this tree grows thrifty, and the second year the borer attacks it.

Mr. H. Dunlap—I have seen them working upon the sprouts of one year's growth.

Mr. Miner—Does Dr. Warder say that these trees in Champaign are free from the borer?

Dr. Warder—I saw them only at a distance. They looked thrifty and well.

Mr. Robinson—It appears to me that as much can be done by preserving the young growth that is coming up as in planting. We know there are many places and large tracts of country where a judicious thinning of the thick undergrowth would be all that would be required in growing extensive and valuable forests. The expenses of thinning would be met in the amount of fire-wood obtained. The thinning out will induce stronger and more rapid growth, and consequently more durable timber. We know that timber that has made rapid growth—a strong burr oak for example—put in as a fence post, will last twice as long as timber that has become brash from slow growth. Timber grown in a crowded, damp place is nothing like as good as that which has room and light in which to develop strength.

Mr. Stewart introduced the subject of birds. They were pecking holes, and pecking to death his trees, and he wanted to know what the Institute was going to do about it, and wanted to know in particular if it was the sap sucker.

Mr. Galusha said that he would know the bird by the shape of its tongue; no other bird has such a tongue. They have a wedge-shaped tongue.

Question—What is the remedy against the bird?

Answer—Shot.

Then said one, who supposed the bird was after the worms, and in particular the borer, what is the remedy for the borer?

Mr. H. J. Dunlap said he knew not how the gentleman would obtain the desired information, except by subscribing for the American Entomologist, published at St. Louis. [Laughter.]

Mr. Ludlow—I would like to ask Mr. Galusha if he has any knowledge of the mulberry tree, as to its durability for posts?

Mr. Galusha—I have never known the mulberry grown for posts. There is a tree that will be grown for posts, that is the osage orange. Also, another tree, the catalpa, will be grown for the same purpose. But the osage hedge will be best.

Mr. Miner—I have a few osage standing in my nursery. They are not likely to make posts.

Mr. Periam—They must have high dry land. They will not stand excessive wetness.

Mr. Robinson—All trees will branch out if left scattering. It is desirable that, for posts, they should have straight trunks. We have the coffee nut tree, which I think makes good posts. It is a free growing tree and splits well.

A voice—Is it not the same as the horse chestnut?

Mr. Robinson—It is altogether different. It has a property that no other wood has, that is, the property of not shrinking in a green state, and can be used for cog wheels.

Mr. Galusha—I would like to know the value of the chestnut tree. I find it does well on high rolling ground, not on wet.

Mr. Robinson—There are some large trees in Tazewell county. They make very rapid growth.

Mr. Parks asked if the silver leaf maples, growing upon the bottoms, furnished good seed. That is, are they the true silver leaf maple?

Mr. Galusha—They are. You get the true variety.

Mr. Robinson said that he planted locust trees, and the borer destroyed them.

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APPENDIX.

The following documents are the memorial to the Legislature alluded to on pages 48, 55, 58 and 59, and the appropriation bill as it finally became a law. Comparing the two, we find the following results:

App. for	Asked.	Granted.
Agricultural Dep't	$38,000	$25,000
Horticultural "	22,000	20,000
Mechanical "	40,000	.....
Chemical "	30,000	5,000
Apparatus, etc	25,000	10,000
Drill Hall	15,000	.....
Total	$170,000	$60,000

MEMORIAL

TO THE HONORABLE MEMBERS OF THE LEGISLATURE OF ILLINOIS, FOR THE SESSION OF 1869.

GENTLEMEN: The Trustees of the Illinois Industrial University, at their recent meeting, appointed a committee to address to you a memorial in regard to the condition and wants of this new State Institution.

It is not necessary to recount to you the prominent part taken by eminent citizens of this State, in securing the grant of public lands for industrial education; nor the almost unprecedented liberality of the citizens of the several sections of the State, in the bids made to secure the location of the University. Never have the people of a state exhibited a higher or broader interest in the foundation of an institution of learning, than the people of Illinois in this.

CONDITIONS OF THE GRANT.

The State, in accepting from Congress the immense gift of 480,000 acres of land scrip, deliberately assented to all the conditions of the grant, and assumed all the responsibilities it imposed. These conditions included the inviolability of the fund and its interest, its perpetual security against loss, the payment by the State of all expenses for its management and disbursement, and, by unavoidable implication, the support and maintenance forever, with its aid, of such an institution as the act describes.

Thus far the State has exhibited much wisdom in the management of this great trust. By wisely appealing to the public emulation of its several counties, it secured for the institution buildings, farms, and other property of great value, without expense to the State, and without diminution of the funds.

A NEW OBLIGATION.

But this generosity of its citizens has only added a fresh obligation to those which the acceptance of the grant imposed upon the State. The pledges made to Congress the State has now repeated to its own citizens. It was for no private or local institution that the several counties bid such princely sums. It was for a University belonging inalienably to the State, and for whose perpetuity and success the faith of the State was irrevocably pledged, that the tax-payers of the several counties were encouraged to vote upon themselves the burden of so gigantic a donation. The State cannot, in justice, and will not, if wise, attempt to thrust upon other hands a duty it voluntarily took upon itself.

ACTS OF THE TRUSTEES.

The Board of Trustees appointed by the State, obeying the mandate of the Legislature, located the University at Urbana, the county of Champaign having, in good faith, paid over its offered donation.

A full statement of the further doings of the Board will be laid before you in the annual report of the Corresponding Secretary. The Trustees have aimed steadily to carry into effect the laws of Congress and of the State Legislature. Acting, as they ought, for the whole State, they have sought to organize the University on a basis worthy the State itself, and of the great public interests involved. Large expenditures were found necessary to alter and fit up the University building for use, to grade and fence the grounds, and to purchase the additional lands, and the teams and tools needful for the present purposes of the institution. These expenditures have been carefully confined to the supply of immediate wants. It has been the policy to diminish as little as possible the permanent funds, in the hope that the University may ultimately be supported mainly, if not entirely, by the income of these funds.

PRESENT FUNDS AND INCOME.

The endowment fund of the University, derived from sale of scrip and from the unexpended balance of Champaign county bonds, is $309,000. The annual interest of this fund is $25,290. About 25,000 acres of lands have been located with the scrip, and 75,000 acres of scrip remain to be disposed of.

The expenditures during the first year, ending March 11, 1868, amounted to $35,076 90, of which $22,693 83 were for purchases of additional lands and for permanent improvements in buildings and grounds, and $2,951 80 for expenses of sale and location of scrip.

The expenditures for the current year will exceed $30,000. It is evident that the income, even when swelled to the utmost by the final sale of the scrip and lands, will be all required to meet the ordinary expenses of the University, and will be much less than that of many institutions with which it must come into competition for both teachers and students.

FUNDS NEEDED FOR OUTFIT.

It early became apparent to the Trustees and others, that a full outfit for the several departments could not be afforded from the ordinary income of the University. The peculiar character of its industrial departments, and its extensive scientific courses, entail upon it much larger expenditures than those of an ordinary college. Its farms, gardens, machinery, cabinets and apparatus will all cost heavily at the outset.

To leave these industrial departments to struggle forward without the necessary facilities for their work, is to doom them to certain failure, and to defeat the aims of Congress and the just hopes of the friends of Industrial Education.

It seems, therefore, the evident duty of the Trustees who have been appointed by the State to watch over this great interest, to lay its wants before you, the representatives of the authority of the State, and the guardians of its interests, and ask from you such action as the case demands.

APPROPRIATIONS REQUIRED.

Appropriations are needed as follows:

1. For the *Agricultural Department*. For barns and other farm buildings for the experimental and stock farms; for houses for farmer and farm laborers; for fences, drainage, wells, windmill, teams, tools, seeds, roads, bridges, shelter and fruit trees, and for stock of several breeds and varieties, $38,000.

2. For the *Horticultural Department*. For horticultural buildings and structures; for house for gardener; for barn and tool house; for teams and implements; for fences, underdraining and roads; for fruit and forest trees for the orchards, forest tree plantations and shelter belts, and for shrubs, plants and seeds of all sorts, $22,000.

3. For the *Mechanical Department*. Whatever may be done at branch institutions, the Trustees regard it as vitally important that some considerable

development shall be given to this department here at the central institution. Even the students of agriculture will need to know the theory of machines, and to understand especially the construction and management of that rapidly increasing array of machinery in use on the farms. For this department there is asked, for shops, tools, machinery, models and drawings, and for lecture rooms and drafting rooms, $40,000.

4. Apparatus of instruction for the several departments. For apparatus, philosophical, engineering, physiological, botanical, veterinary, etc., and for books, charts, cabinets, cabinet cases, models, plans, etc., $25,000.

The high importance of the chemical department, and its broad fundamental relations to agriculture and to all the industrial arts, demand that it shall be furnished not only with ample lecture rooms, but with working laboratories, in which large classes of students shall be accommodated with facilities for practical work in the several departments of analytical chemistry and mineralogy. There will be needed, for such purpose, about $30,000.

There is also greatly needed a drill hall, for the military and other exercises in inclement weather and in the winter season. The importance of such a building has been acknowledged everywhere, and most of the older institutions are now provided with gymnasiums. In our State, where the nature of the soil almost forbids outdoor exercise during so much of the winter and spring months, this is doubly important, and the military tactics required by Congress can scarcely be taught without it. It is estimated that it will cost $15,000.

A detailed statement of the several items of each appropriation has been carefully prepared, and will be presented to the appropriate committees.

REASONS.

The reasonableness of the amounts of these several appropriations will appear to any one who has even a slight acquaintance with the cost of institutions of higher learning. Their necessity is absolute. The University cannot go successfully forward without them. Our people will neither honor nor patronize an institution of mean proportions and cheap appointments.

No intelligent agriculturist or horticulturist will think too much is asked to furnish the gardens, orchards and farms on which the great problems in agriculture, in all its branches, and in horticulture, fruit growing and tree planting, are to be investigated and taught for the benefit of these gigantic interests in this great State. An interest which, in 1866, had already invested in cultivated farms and live stock over $400,000,000, and yielded, in its annual production of grass, grain and roots, $160,148,704, may certainly ask so small a sum as is here asked for the cultivation of the science and skill needed for its successful control.

And it should be remembered that the experimental farms and gardens are to be conducted quite as much for the promotion and diffusion of agricultural science throughout the State, as for the mere purposes of instruction inside the University. It would require but a very few acres to illustrate to the student the several processes of husbandry as already known, but to carry on a full series of experiments in field crops, fruit growing, tree planting and

stock rearing, for the benefit of these great industries throughout Illinois, will amply occupy 600 acres, or even the 1,000 acres accepted by the State for this use from Champaign county.

The Hon. John P. Reynolds says, in his report on the Paris Exposition: "Almost all important efforts and experiments in Europe, the result of which has been to improve agricultural practice and increase production, have originated with the governments, or in special schools, maintained in whole or in part by government patronage, as necessary measures of political economy."

The sum asked for the mechanical department is moderate, when compared with the amount given by Massachusetts to her Institute of Technology, and with the immense value of this department to our great manufacturing interests still in their infancy, but already, in 1865, amounting in their annual products to $63,356,013. It is to their schools of this sort that France, Belgium and the German States owe their supremacy in manufactures. In the great Paris Exposition of 1866, England found herself beaten, at almost every point, by the French artisans, trained in the great Polytechnic schools of France. If Illinois shall ever compete successfully with New England in manufactures, we must do it by brain power, by minds trained to understand and direct machinery and manufacturing processes. Educated mechanics will do more than tariffs to introduce manufactures throughout our State.

The appropriation asked for the various apparatus of instruction amounts to only one-fourth of the sum lately expended by the Cornell University for these purposes, and there is no prominent college or university in the country that has not much larger sums than this invested in cabinets and libraries. Not one of the appropriations asked for is more vital to the real work and power of the University than this, and if the amount were $100,000 it would be a most wise expenditure. Apparatus teaches to the sight, and trains the student to use his own eyes, and to become a keen observer of the more magnificent apparatus with which God continually teaches those who can learn, in the great school of nature. Years of hard, and often fruitless, study can often be saved our youth by good instruments of instruction.

The entire amount asked for all purposes is but trifling when spread over the taxable property of the State. It is less than one-thirtieth of one per cent. The amount asked for the agricultural and horticultural departments is less than two mills for each acre of land in the State.

IT WILL PAY.

If the University shall lead to the discovery of new methods, or diffuse more widely those already known, and thus teach how to raise one bushel of corn more from each acre planted than was raised per acre in 1866, it would, at forty cents a bushel, add more than $1,000,000 to the annual harvest of the State.

If, by stimulating and directing the taste and skill of the farmers of the State to new cultures and better methods, it could add only *one per cent.* to the annual farm products, over those of 1866, it would increase the production $1,600,000.

It is asserted that noxious insects destroy, annually, over $20,000,000 in fruits, trees and grain. If the University shall teach how to avoid the ravages of a single species, it will save more than the entire cost of the institution.

If its experiments, widely published, shall save the farmers and fruit growers from useless experiments with worthless fruits, grains and trees, it will save annually to the State hundreds of thousands of dollars now wasted.

If its influence shall increase the tree planting throughout the state, it will give back in the wealth, and health and beauty of the State a hundred times all it now asks to carry out its plans.

If its mechanic shops shall stimulate the inventive genius of a single inventor of agricultural or other machinery, like the horse cultivator, rake or reaper, it will open a perpetual source of wealth.

If it shall help to develop our manufactures as such institutions have done, it will, like pumps sunk in deep wells, give out in perpetual streams what it asks now in quarts.

If it shall help to save the rich soil of our State from ultimate exhaustion by bad and wasteful husbandry, or shall teach how to bring under tillage lands now worthless or shall incite to a saving of the millions worth of manures now left to be wasted, how immense will be the returns it will yield for coming ages.

Nor are all these mere baseless suppositions. We are fully authorized by the past history of industrial schools to aver that this, if liberally fostered, will help to enrich the State a thousand fold more than all its costs.

While other appropriations are asked by charity or extorted by crimes, and are gifts from which no returns are asked, this is an *investment*, in the industrial fields and forces of the State, and will pay back every ten years all it asks. A million of dollars spent in this way would be wisely laid out, and would glorify and enrich the State beyond computation, and for ages to come.

ACTION OF OTHER STATES.

The liberality exhibited by other states, and by some of those of far less power and wealth than our own, encourages the Trustees to hope that a wise and liberal policy will be pursued towards the University. Pennsylvania appropriated to its Agricultural College $200,000. New York gives to Cornell University $18,000 a year, after having given it 900,000 acres of Agricultural College Land Scrip, to which Mr. Cornell has added about $800,000. That state also gives to the Renssalaer Polytechnic school $15,000 a year, and nearly $40,000 to other colleges. Massachusetts has given to the new Agricultural College of that state $91,000, to the School of Technology $262,444, and to the Museum of Zoology $180,708. It has also given to Harvard and to other colleges, within ten years, $128,500. The total gifts to Harvard amount to $215,797 73. Michigan has appropriated to its Agricultural College $198,398, besides large donations of state lands. It has also given to its State University $100,000, and now tenders it the income of a tax which will yield $15,000 a year, and this although its endowments already afford nearly $40,000 per annum. Wisconsin has given to the agricultural department of its State University $30,798 50, and to the University itself $27,504 84, and now gives it $7,303 76 annually.

The following tabular statement exhibits the sums paid to higher institutions of learning by the states whose statistics have come to hand:

States.	To Colleges and Universities.	To Agricultural and Polytechnic Schools.	To Normal Schools.
Maine........	$34,000 and lands.	....	....
Massachusetts.	$344,297 73.	$534,152.	$193,400 in 10 years.
Rhode Island..	....	....	$3,000 a year.
Connecticut...	$80,813 80.	....	....
New York....	large amounts. $40,000 yearly.	$33,000 yearly.	$106,000 yearly.
Pennsylvania..	....	$200,000.	$12,000.
New Jersey...	....	....	$11,000.
Maryland.....	$28,650 yearly.	$32,750, $6,000 annually.	....
Virginia......	$198,000, $15,060 yearly.	$15,000.	....
Alabama	$300,000.	....	....
Indiana.......	$8,000 yearly.	....	....
Michigan.....	$100,000, $15,000 yearly.	$168,320.	22,000 acres of land, $9,700 yearly.
Wisconsin.....	$7,303 76 yearly $27,594.	$30,798 50.	large land grants.*
Kansas.......	$27,594 84.	$30,798 50.	14,400 acres of land, $35,637.
Minnesota	$15,000 for one year.	....	....

Thus far in her history, Illinois, as a state, has done very little for the promotion of this higher form of education. Her citizens have done generously, but as yet no statute graces her records, making a direct appropriation for the promotion of liberal and scientific education. Circumstances have heretofore prevented the founding of a distinct State University, and her liberality has found no channel tempting its exercise. But now the State has a University closely linked to its great industrial interests, and indissolubly bound to its own name and fame. The Industrial University belongs inalienably to the State. The world recognizes it as an institution of the State. Its prosperity will be both a blessing and an honor to the State; its failure would be both a curse and a shame.

With these considerations in view, the Trustees earnestly solicit, and confidently hope for, the favorable action of the Legislature. A failure to make the appropriations asked would be so disastrous that years could not repair the loss. The prompt development of the University will give early to the State the fruits of its work and afford its advantages to hundreds who will otherwise fail to receive them.

J. M. GREGORY,
Chairman of Committee.

AN ACT MAKING APPROPRIATIONS FOR THE BENEFIT AND COMPLETION OF THE ILLINOIS INDUSTRIAL UNIVERSITY.

SECTION 1. *Be it enacted by the People of the State of Illinois, represented in the General Assembly,* That the sum of sixty thousand dollars be and the same is hereby appropriated to the Illinois Industrial University, located at Urbana, Champaign county, Illinois, in amounts and for the purposes hereinafter set forth, viz:

To the agricultural department, including the erection of barns and other out-buildings for the experimental and stock farm, houses for farmer and farm laborers, fencing, drainage, wells, teams, tools, seeds, roads, bridges, fruit and forest trees, and stock of several breeds and varieties, twelve thousand five hundred dollars per annum, for two years.

To the horticultural department, including horticultural buildings and structures, house for gardener, barn and tool house, horticultural implements, fencing, underdrainage, roads, forest and fruit trees, shrubs, plants, etc., ten thousand dollars per annum, for two years.

To the chemical department, the sum of five thousand dollars. To be used for other apparatus and for books, by direction of trustees, ten thousand dollars.

§ 2. The Auditor of Public Accounts is hereby authorized and required to draw his warrant upon the Treasurer of the State of Illinois for the said sums of money, upon orders of the board of trustees of said University, signed by the regent and attested by the secretary of said board, with the seal of said institution affixed thereto. And it shall be the duty of said treasurer, and he is hereby authorized, to pay the same out of moneys in the treasury not otherwise appropriated: *Provided*, that said orders of said trustees shall not be given except as, in their judgment, the necessity arises for the expenditure of the moneys so appropriated for the specific purposes herein provided.

§ 3. This act shall be deemed a public act, and shall be in force from and after its passage.

§ 4. The board of trustees shall not create any indebtedness nor incur any liabilities beyond the provisions of this act.

APPROVED March 27, 1869.

INDEX.

NOTE.—It will be observed that the pages numbers 41–48 are duplicated. In indexing, we have referred to the second series of folios as 41 a, 42 a, etc.

1942

1942